

The Mining And Metallurgical Journal

VOL. XX. NO. 3

LOS ANGELES, CAL.,

November 1, 1898,

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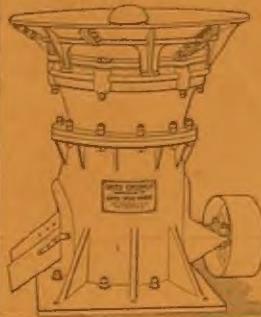
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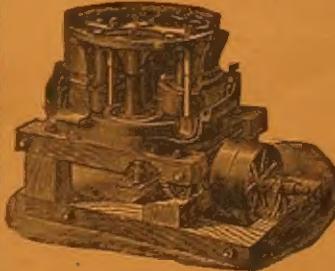
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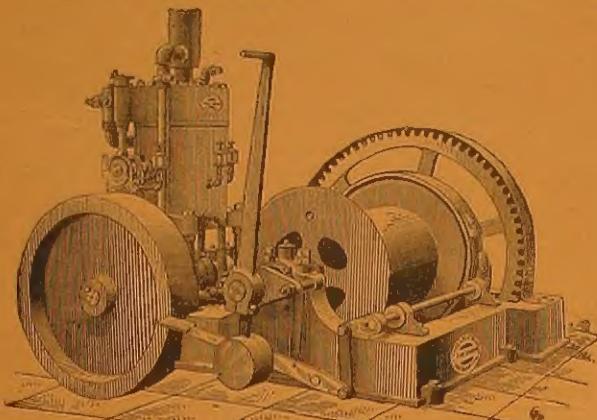
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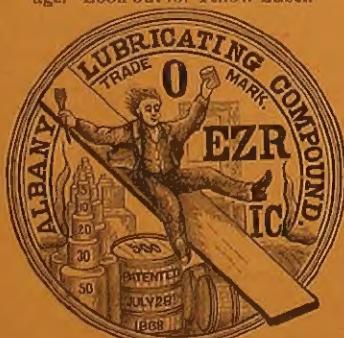
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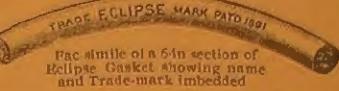
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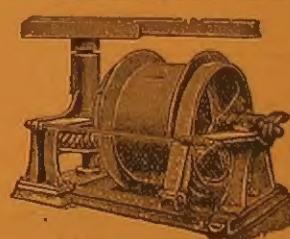
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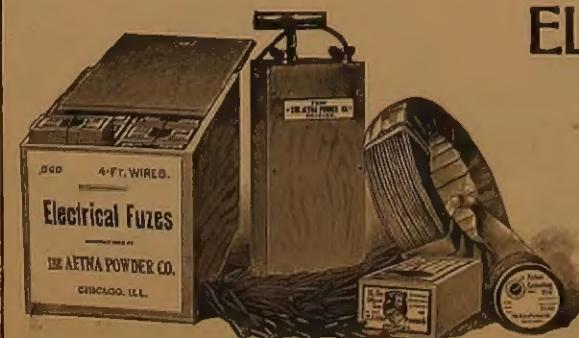
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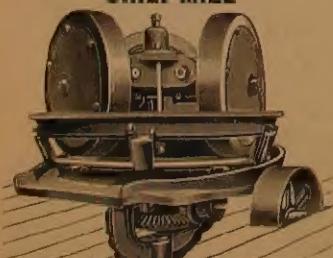
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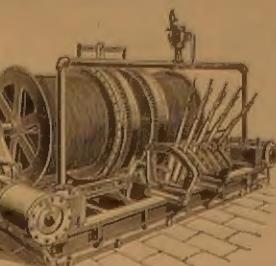
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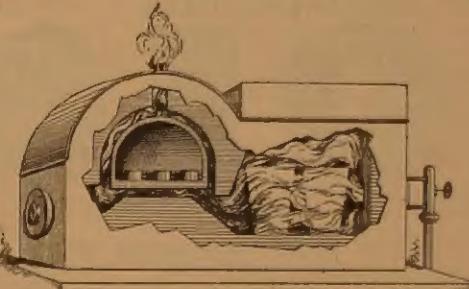
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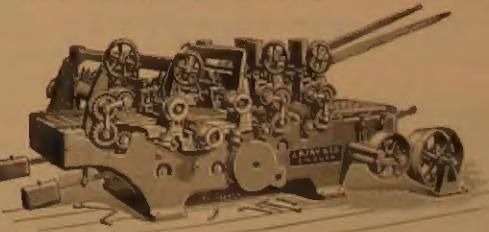
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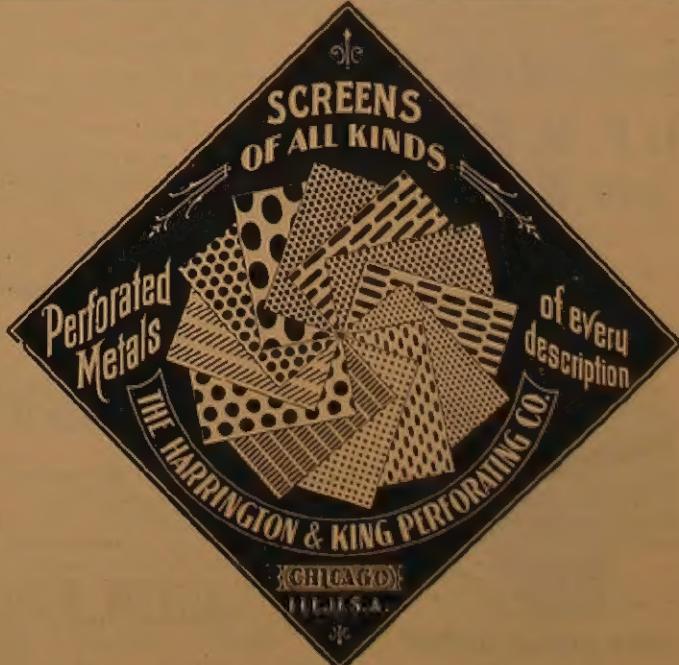


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The Mining And Metallurgical Journal

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NEW USE FOR ALUMINUM.

The extended use of Aluminum on a large scale has been the desire of its manufacturers for a long time, and at last that opportunity has presented itself. Although it possesses but 63 per cent. of the electric conductivity of copper, its extremely light weight, being three and a third times lighter than that of copper, it has been found to be a more economical metal in the form of wire for transmitting electricity. It is proposed to use it for transmitting power from Snoqualmie Falls, Wash., to Tacoma, a distance of 45 miles. Its use has also been adapted at Niagara Falls. On account of being a poorer conductor of electricity than copper, a larger wire is required to be used, but the tensile strength of the Aluminum wire is much greater. There does not seem to be, however, much danger of its taking the place of copper, except on transmission lines for telegraph, telephone and power uses. Its softness or elasticity being greater than that of copper, it may be found to be not suitable for street or trolley car use. For winding and dynamo purposes its greater bulk over that of copper would prevent its use. In northern districts, its greater diameter of wire used would hold more snow and ice in winter, and endanger the line to breakage from that cause. It will require to be produced in larger amount and at lower cost than at present before it takes the place as a competitor of copper for electrical use.

BLAST FURNACE GAS.

It is only a few years since the waste gas of the blast furnace was utilized for heating boilers for steam purposes. The general adoption of the gas engine, first in small-sized engines, and more recently in those of large capacity, equal to that of steam engines, have made the use of large gas engines operated by the waste blast furnace gas possible. In Belgium and Scotland, this economical use of a formerly wasted by-product in smelting iron ore has been adopted on a large scale.

When it is remembered that for each ton of pig iron smelted, there are consumed about two tons of coal or coke, and there are produced in waste gas about 150,000 cubic feet, the economy and profit to be gained by the iron furnace must have an appreciable effect on the profits of iron production. This economy can be of benefit to both large and small furnace plants, and may tend to render iron smelting profitable at points further removed from the coal fields than was formerly possible; on this account it has special interest to the iron industry of the western states. It is quite within the bounds of future possibilities in this progressive measure that, by using compressed air along with the blast furnace gas, a still greater benefit will be obtained, as it may increase the explosive force and volume of the gas. The application of the gas engine for this work instead of using steam boilers and steam engines, will have the effect of increasing the demand for large gas engines, as well as in making the district around a blast furnace an industrial center for power, where the power is not used for rolling mill or other iron manufacturing purposes.

SAFETY IN BLASTING.

The too frequent occurrence of fatal accidents in blasting are largely due to carelessness and supposed economy.

While spitting a round of twelve holes in the Green Mountain mine of Butte, Montana, last month, J. J. and J. F. Neary were killed by a premature blast. The incautious handling of explosives and accidents from that cause is the result of long association with the known dangerous article. Old experienced miners too often grow careless in handling explosives on the principle that too close familiarity with danger becomes an old story and produces contempt for the consequences of a rash act. The above accident was apparently the result of want of forethought as to the rate at which ordinary fuse burns. Many suppose that fuse burns at the rate of one foot per minute, when in fact the speed is one foot in 30 seconds, and may account for the premature blast when others had to be touched off.

When more than one hole has to be exploded at one point at the same time, safety and economy can be assured by the use of the electric fuse and battery. Simultaneous explosion is the result of electric blasting, and the gain is in safety from premature explosion and increased amount of ore blasted, as the result of two or more holes fired simultaneously is greater than the separate explosion of each hole by the use of ordinary tape fuse. As in the union of the labor of individuals there is greater strength than in the separate efforts of the same number of persons, so it is in the electric system of blasting two or more holes at the same time, more ore is mined with economy in the amount of explosive energy employed. The reduced cost and greater power of electric batteries from what they were twenty years ago, places these safeguards to life within the reach of every miner and increases his daily output of ore.

MINERAL OWNERSHIP.

When our neighboring States are comparing their mineral production with that of California, the fact is not noticed that a large portion of the mineral territory of this State has passed into private ownership in the form of Spanish Land Grants, Railway Land

Grants, and mineral lands patented as Homesteads and Pre-emptions. The large surface area of California is often remarked upon, but the mineral territory at present closed to the prospector and miner is lost to memory and sight. This wrong condition of mineral ownership is against the best interests of the whole State in retarding mineral production, and is enlarged to some extent by the restrictions put on hydraulic mining. Every editor of a newspaper in the State who desires to see this country prosper should advocate the separate ownership of surface rights from the mineral or underground rights. If all the minerals in California were owned by the State in trust for the people, who are willing to risk their lives and capital in working them, then all the mineral land now closed by the worst form of monopoly known would be open to the efforts of the prospector and miner, to add to the wealth of the community. This principle is in harmony with our Federal law, which grants mining claims to those who have the courage to work them, and makes work or development the only condition of ownership. Under this condition the vast mineral wealth of the west has been discovered and produced. Government or State control of the minerals, operated under the most liberal laws, is the best form of ownership for the prospector and miner, as the minerals of the country are only a source of wealth when in active operation. The annual loss in mineral production to the State of California from this cause is too large a factor in our industrial progress to be longer tolerated by a progressive people, and calls for State legislation.

THE PARIS EXPOSITION.

Southern California is rich in minerals, the development of which has scarcely yet commenced, though gold was discovered in this section several years before Marshall reported his find at Colona, on Sutter Creek, in the northern part of the state, which set half the world crazy. Among the minerals of Southern California, in addition to gold and silver, are petroleum, iron, borax, copper, rock salt, gypsum, limestone, granite, marble, sandstone, and numerous other, all of which would make a beautiful as well as valuable collection to be placed in the Paris Exposition.

It is the earnest desire of every mining man who has the interest of the southern country at heart that a better showing be made at the coming Parisian event, in 1900, than was made at the Omaha exposition, where only one consignment of samples was sent from the City of Los Angeles, and only a very few from the whole of Southern California.

It is therefore timely that the press should begin the agitation of this subject that efforts be made to secure adequate legislation, municipal, and private financial aid in the collection of an exhibit which will be worthy of the west, especially Southern California, and its greatest and most important industry. Local committees should be organized to collect ores, to properly classify them and determine their value. These things cannot well be done in a hurry.

It will be well to impress on the minds of those interested that from past experience it has been shown that to depend on the miners to send samples in, or leave it to any one and expect them to devote their time to gathering samples and arrange them without compensation would prove a dismal failure.

The business men of Los Angeles would

gladly give small sums for the purpose of employing an experienced man and sending him into the different camps to make a collection of the minerals necessary for a representative display, and at the same time samples could be secured to establish a permanent cabinet in the Chamber of Commerce, in fact, a duplicate of the one sent to Europe.

Only seventeen months remain before the opening of the great exposition, and, if Southern California is to be represented, it is about time some active steps were taken. The railroads will all aid in the task more or less, and with the combined effort of the mining districts a creditable showing can be made.

Colorado is already taking steps to have the exhibit at Omaha sent to the French Exposition, but they do not intend that it shall be all that is to go, they propose to lead in the procession if possible.

As Southern California has no exhibit at Omaha to send, it will be necessary, if we do not want to be at the tail end, to get together as extensive a collection of ores as time will permit.

Colorado claims:—"It is able to make an exhibit in a mining way which no other state or region can surpass;" also, that "it is not only able to make a display of minerals of thousands of varieties and great value, attractive to the eye, but it can show financial results which have accrued to the mining investor and operator in this state (Colorado) and which have made him wealthy."

California's mineral exhibit at the World's Fair in Chicago in 1893, elegant as it was, did not do her justice. In many respects it was successful, but it is far more important that our showing at the exposition in France should, to be truly representative, be larger and more attractive than the one in 1893, for we are going to be brought under the criticism of people who have the capital to aid in the development of our mineral resources.

THE RATIOS.

The ratio in coinage of the precious metals has been a subject of discussion for several years in this country, and a conclusion as to what it should be has by no means been definitely reached to general satisfaction. The subject has a history which will be entertaining to the curious, and of value in bringing about a final and lasting result. The ratio has never been based upon cost of production or relative quantities produced, but has been arbitrarily fixed, and fluctuating from time to time.

In some of the ancient states silver was superior in value to gold, especially was this the case in Arabia and Germany. In some of the states of Italy, it was two of silver to one of gold. In remote antiquity, silver appears to have been equal in value to gold. There were times when silver became so exhausted as to threaten the decrease of money and to arrest it, the value of silver was arbitrarily raised by rulers. In later times, in Greece, the ratio was 13 to 1, on account of the large production in Macedonia.

When the Romans acquired the placers in Pannonia, Dacia, Spain, and Gaul, their principal coins became gold, and at a later time when the supplies of gold fell off, the value of silver was raised to one tenth, and later to one-eleventh, and then to one-twelfth. In the Arabian states, in the 7th century, the ratio was 6½ to 1, yet in France at the same time it was 10 to 1, and in the 12th century, in England, it was 9 to 1. In France, in the 14th century, it was 1 to 1, while in Castillo

and Leon it was 7½ to 1. From the time of the rise of Mohammedanism to the opening of the silver mines in America, the value of silver as compared with gold gradually rose.

In Spain, by an edict issued in 1497, the ratio was fixed at 10½ to 1. At first, the fruits from American mines were gold and not silver, and, by increasing the relative value of gold, wealth was added to Spain; and, in 1746, the ratio was further raised to 13½ to 1, which was before the silver mines of Potosi were known. As she then monopolized the supplies of the precious metals, the rest of the world was obliged to acquiesce.

During the next century, Portugal obtained such immense quantities of gold from the East Indies, Japan, and Brazil that she governed the ratio, and, in 1688, raised the value of gold to 16 to 1. Except for a brief period, this ratio has been maintained in Spanish and British America and in the United States. In 1775, Spain raised the ratio to 15½ to 1, on account of the large production of silver in her American possessions. In 1785, France adopted the Spanish ratio, which she still maintains.

Afterwards an economical school arose which successfully urged the coinage of silver on government account only, while the mints were left open for the coinage of gold on private account. The closing of the mints to silver, while they have been left open to gold at a fixed valuation, has enhanced the purchasing power of gold as compared with silver. The price of silver uncoined being quoted in gold, the phenomenon appears as a fall in silver. "This fall in its causes, consequences, and remedies constitute the silver question." It should be added, however, that the fixed and unchangeable value of gold, which unlimited coinage tends to produce, is further strengthened by parliamentary law, which compels the Bank of England to purchase all gold offered at a price about equal to its coinage value.

There seem to be no very reliable statistics showing what proportion of the gold produced is consumed in the arts, and for the reason that it is a general practice to melt the coins when most convenient for that purpose. On the other hand, statistics on this point are more complete and reliable in regard to silver. It is shown that of the silver produced in the western hemisphere since America was discovered, a little more than three-fourths have been consumed in the arts, and a little less than one-fourth in coinage. The production since that time has been about 15,000,000 tons.

Gold is found in nearly all silver ores, and it is asserted that of the \$240,000,000 yielded by the Comstock lode, nearly one-half in value was gold.

STRONTIUM AND ITS USES.

Interest has lately been awakened in this matter on account of several newspaper articles describing discoveries both in California and at Put-in-Bay, in Lake Erie, Ohio. At the latter place a most beautiful cave has been opened, lined with crystals of celestite of all sizes, making a natural curiosity well worth a visit. Strontia is a material very similar to lime in its properties, deriving its name from Strontian, a mining village in Argyleshire, Scotland, where it was first found. It is usually found as Celestite, Strontium Sulphate, or Strontianite, Strontium Carbonate.

At Put-in-Bay there is an area of about

twenty acres square that is apparently underlaid with a workable deposit of celestite. This form has not much use at present, but a process has been perfected to convert it cheaply into such salts as are needed. The deposit is several feet thick where opened, and the average returns of forty tons shipped away gave an average of 98 per cent. pure celestite. The best known use of strontium salts is in the manufacture of fire-works, as its chloride and nitrate make the red fires. The use of the other salts made from this mineral is, however, increasing, and promises in the near future to be greatly extended, provided a large out-put can be delivered cheaply. Strontium Hydrate is used by beet sugar refiners to remove the last of the sugar from the molasses.

At present lime is used but this is not as good as it cannot be used in a hot solution. Barium carbonate can also be used, but as it is poisonous, and a small amount remains with the sugar, causing, it is said, Bright's Disease, there should be a prohibitive law against its use. The sugar refiners of the coast do not use Strontium, as the price at which they can obtain it is too high. However, it is used over and over again, only a small loss having to be replaced occasionally.

Strontium chloride is now being used by the zinc etchers in their photo etching processes in preparing collodion for their negatives.

In medicine, Dr. Alex. Griggs of Rhode Island writes:

"If we have in the strontium salts remedies that can be used in full doses and for a long time without the unfortunate effects which sometimes follow the potash salts, it behooves us to give our patients the benefit of the fact. Bromide, Iodide and Lactate are the drugs used. The Bromide is used as in Bromide of potash as it does not produce any gastric disturbance or depressing influence. The Iodide of strontia can be pushed far in excess of the potash salt. The Lactate is used mainly in Parenchymatous Nephritis."

However, it is important that the drug should be perfectly pure as much of the commercial drug is adulterated with Barium salts.

The following salts of strontia find a market:

Strontium Chloride,	Strontium Oxide,
" Carbonate,	" Peroxide,
" Oxalate,	" Bromide,
" Nitrate,	" Iodide,
" Sulphate,	" Lactate,
" Hydrate,	"

These salts vary in price from 8c. to several dollars per lb., depending on the cost of preparation. In this country the celestite as it is mined sells in bulk for \$10 a ton, or \$20 a ton for small lots. The celestite, however, is much cheaper in England.

As a paint adulterant it has a brilliant white color and has a weight about the same as Barytes, but at present it is too rare to be supplied like Barytes, ground, at cost of from nine to fourteen dollars per ton. Ground or precipitated it makes an excellent material for weighting papers, etc., as its specific gravity is so much greater (2.97 against 3.96) than Calcium Sulphate.

With the increase of the beet sugar industry the demand for the carbonate is likely to increase. It can be made cheaply as a by-product in the manufacture of caustic soda or potash, or the hydrate can be prepared directly from the celestite.

In California, the carbonate is said to be found with the celestite, but at Put-in-Bay none has been found so far.

WILLIAM M. COURTIS,
Oct. 21, 1898, Detroit, Mich.

CRUSHING ROLLS.

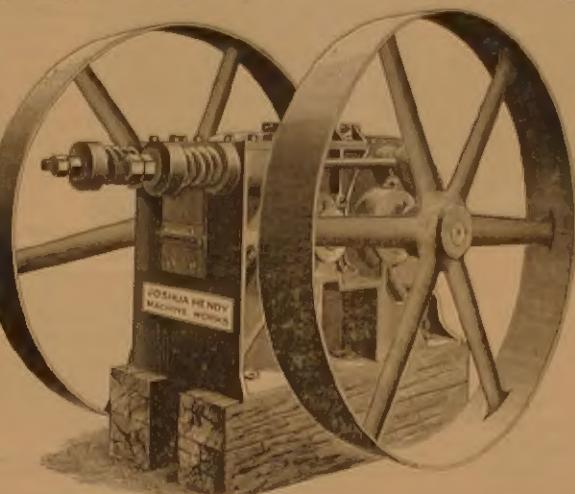
The accompanying cuts present the end and side view of a form of crushing rolls, for use in concentrating and cyanide plants, as built from designs and patterns of the Joshua Hendy Machine Works of San Francisco.

These rolls are driven by a pulley fitted to each roll shaft, which method permits of great speed and crushing capacity. The adjustable roll is mounted on a swinging arm pivoted at the bottom; its top being held in place by a heavy tension rod on each side, fitted with heavy steel spiral springs and adjusting nuts. The journal boxes are of the ball and socket form, which precludes any unequal strain upon the bearings—an important feature in their design and construction. Each roll shaft carries a taper center, upon which are secured the shells made of chilled cast iron or cast or forged steel. The feed hoppers are lined with white iron plates which can easily be replaced at a small cost.

The capacities of crushing rolls depend upon their size, speeds, character of the ore and fineness to which it is to be crushed.

Ordinarily one set of rolls is all that is required, but when fine crushing is necessary, two sets are generally used.

These rolls are built of the sizes and approximate capacities as set forth below:



CRUSHING ROLLS—END VIEW.

TABLE OF DIMENSIONS—BELT-DRIVEN ROLLS.

Size of rolls	Size main driving pulley	Size of small driving pulley	Revolutions	Weight	Cap'city in tons per hour
10x16	48x8 inches	24x6 inches	150	4,500	2
12x20	50x10 "	30x6 "	130	6,300	3
14x22	50x12 "	34x8 "	110	12,500	5
16x26	50x12 "	42x8 "	85	18,000	8

A RIVAL OF ACETYLENE GAS.*

If report be true, acetylene gas will shortly have a rival in carboline, for the production of which blast furnace slag is stated to be especially suitable. Preparations are being made at Hammond, Indiana, near South Chicago for utilizing slag for this purpose.

The inventor of the process of manufacture is Mr. Herman L. Hartenstein, a Chicago chemist, who has taken out a patent for utilizing the waste products of blast furnaces in the manufacture of carboline, from which ethylene gas is produced, defined as an improvement on acetylene, but having the same characteristics. Carboline is a combination of the carbides of calcium, aluminum and silicon, and for its production blast furnace slag is especially suitable.

The method of production is described as follows: The slag is almost as fluid as water, and by means of ladles operated by hydraulic power, it is passed into converters similar to those used for the manufacture of Bessemer steel. The tuyeres are so arranged that finely

pulverized coke may be fed through them. Before the slag is poured into the converter a strong gas blast is forced through the pipes to keep the molten mass from running into and filling them up.

As soon, however, as the slag is poured into the converter the pulverized coke is fed into the molten mass. This is continued until the slag is thoroughly impregnated with the coke. When the mixture is complete the converter is turned on its shaft so as to allow the mass to flow between a series of carbon bars or electrodes which serve to introduce a powerful electric current. Coke is an excellent conductor of electricity, while slag is a resistor. The result is that the particles of slag in connection with the particles of coke

oil. Each pound of carboline will produce five feet of gas. Each cubic foot is equal in illuminating power to fifteen feet of ordinary coal or water gas.

The unused Bessemer plant at Hammond has been secured for the manufacture of carboline, and is now being fitted with the necessary electrical appliances. If the claims of the inventor are substantial, he will turn out a product which will make a better gas than acetylene for isolated lighting, at a much lower cost. If the slag can thus be made valuable the cost of producing iron may be considerably diminished.

Electrolytic Deposition of Silver.

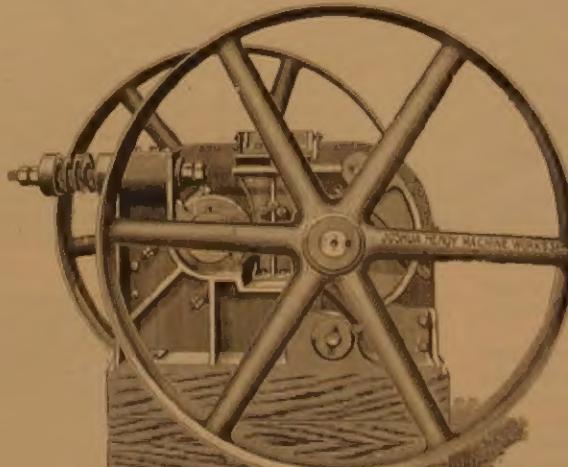
Instructions for the electrolytic determination of silver are to be found in many textbooks, but notwithstanding that such directions are carefully followed, the results obtained by the authors, after many trials, are always uncertain and usually unsatisfactory. The directions given err in insisting upon the maintenance of a certain current density, instead of a constant electro-motive force. In order that the metal may be precipitated in a weighable form, it is essential that the electro-motive force should not exceed a certain value; but as electrolysis proceeds the concentration of the silver in the solution decreases and the resistance of the cell increases. If, therefore, the current is kept constant, the electro-motive force in the cell must increase, and may soon exceed the limiting value. Upwards of 100 experiments were made with a view to finding the most suitable experimental conditions. It was found that perfect precipitation is obtained when the solution (volume about 150 cubic centimeters), containing about 0.5 gram of silver, is mixed with one or two cubic centimeters of nitric acid, specific gravity 1.4, and five cubic centimeters of alcohol, the electro-motive force being kept constant at 1.35 to 1.38 volts for from six to eight hours. Excellent results are obtained by this method of working, the maximum deviation from the mean of six analyses of an ordinary coin amounting only to 1 in 2,000, which, when considered, is an excellent result.

Cyanide Poisoning.

There have been several cases reported lately of cyanide poisoning. Practical experience has shown that peroxide of hydrogen may be considered a powerful antidote for cyanide poisoning. It has recently been applied successfully in 2½ to 3 per cent. solution, as subcutaneous injections, which were performed every four minutes at different parts of the body. At the same time the stomach was washed out with a 2 per cent. solution. Peroxide of hydrogen forms with hydrocyanic acid oxamide, which is a harmless compound.

The Alaska-Mexican Milling Company, Douglass Island, worked 13,627 tons of ore in July, which yielded \$2.38 a ton, and the Alaska-Treadwell 21,000 tons, which averaged \$3.18 a ton on the plates, and these mines are dividend payers too!

*An article in a former issue of the JOURNAL having called forth numerous inquiries concerning Acetylene and Ethylene Gases, we publish the following believing it will be of interest to our readers.



CRUSHING ROLLS—SIDE VIEW.



THE CHEROKEE-LANYON ZINC SMOELTERS, PITTSBURG

SOUTREAST KANSAS LEAD AND ZINC INTERESTS.

Willard N. Richart has an article in the *Age of Steel*, of St. Louis, descriptive of the Missouri-Kansas lead and zinc production, from which we take the following:

The upward tendency in prices of both lead and zinc ores is causing a wonderful activity all over the entire Missouri-Kansas district, and the old abandoned mines, which for years have been as dead as Caesar's ghost, figuratively speaking, are receiving the attention of the miner whose search for the ores which abound in this district is very perceptably stimulated by healthy prices being paid for the ores.

The turn-in for the week ending September 17th was smaller than that of the previous week by 77,700 pounds of zinc ore and 137,710 pounds of lead ore, and the consequent decline in the value of the district output was \$21,595. During the corresponding week last year top grade jack bought \$22.50 per ton and lead opened at \$24.75 and advanced by bounds and closed at \$29.50.

The turnin of zinc was less last year than for the week just closed by 506,610 pounds but the lead turnin was greater by 288,240 pounds, the value being less by \$24,600. For corresponding thirty-six weeks of last year the zinc turnin was less than for the same period this year by 64,567,740 pounds, but the lead turnin was greater last year by 1,145,490 pounds, this being due to the fact that about 1,500,000 pounds of lead is being held for \$25 per thousand. The value of the turnin was less by \$1,489,848. The following is the turnin from the Galena-Empire district:

GALENA EMPIRE.

Most all of the operators on the North Empire Company's lease are at work. Following was turned in from the lease for the week ending September 3d:

	Zinc	Lead
Walters & Co.....	2,090	.....
Xmas Eve Co.....	3,990	520
Rock Island Mining Co.....	2,500	.....
Crown Point Mining Co.....	29,250	.....

	Zinc	Lead
Pump Shaft	84,110	9,400
B. Miller & Co.....	.....	3,380
Ben Buttler	7,760	13,760
Wallace & Sons.....	20,490	.....
Brown Bros.....	1,820	290
Old Virginia.....	1,750	2,730
Blanche Parker.....	3,430	300
Totals.....	119,060	28,910
Value, \$2,414.		

Value, \$2,414.

The history of Galena as to birth and parentage is much the same as Harriet Beecher Stowe's juvenile negro, "who just growed," and for that reason Galena has never indulged in the luxury of a report from each lease doing business in Galena, but the value of the output is ascertained by the amount of ore purchased by each ore-buyer, hence we can not give the individual production of the numerous properties on each lease in Galena, as is done by Joplin, Webb City and Carterville, although the North Empire syndicates furnishes such a detailed account. But then Galena never was much on technicalities and formalities and

preferred to whoop things up and never be "behind the money" in the race for the almighty dollar, and the output from the Galena Empire district last week, which was valued at \$38,931, will bear out the above assertion.

GALENA CRUSHING PLANTS.

The Star Mining Company on the Galena Lead and Zinc Company's land, started up their new steam concentrating plant last week. The plant is equipped with an 85 horse power boiler, a 45 house power engine, 12 inch crusher, two sets of rolls and a set of chat rolls, five cell roughers and six cell cleaners. They are drifting at 65 feet on a large face of disseminated ore and are hoisting from two shafts. Mr. Hugh McIndoe is the manager of the company.

The Maggie Murphy plant, on the Shelbina lease, is running steadily and makes a big output of both lead and jack each week. This



SCRNH IN LEAD AND ZINC MINING DISTRICT, GALENA.

mine has been one of the steadiest producers in the district.

Luke & Co. have about completed their new concentrating plant on the Shelbina lease and expect to start up Monday.

Miller & Ermmons have bought the Troy crusher on the McCann lease, and are overhauling and repairing it. They will buy crush ore and sludge.

The Eureka plant is being moved from the Bloomington ground to the Battlefield. The Oliphant and the Consolidated Company plant on the Battlefield are running in good shape.

J. R. Holmes' plant on his lease is running steadily and is making a good output of ore every week.

The Eugenia plant on the Midway lease is running steadily on rich dirt and producing about 40 tons of jack weekly. They are working new ground.

The May Bell, Buck Horn, Monte Cristo Topeka and Luck & Co plants are all working this week and will make large sales of ore.

Most all the operators are at work this week and the shipment of ore from Galena will be considerably larger than the previous week.

ANOTHER KANSAS ZINC FIND.

A number of gentlemen, led by Col. Borgau, drove out to the Fairman farm, east of Fort Scott, Bourbon county, last week, to inspect the zinc indications that have been attracting considerable attention lately. Col. Borgau is a veritable path-finder, and with hammer in hand led the boys a merry chase in search of the shining rocks. There is no question but that there is "jack" to be found in that section, and the fact that it can be found on the surface at numerous places would indicate that it might be found in large quantities if proper prospecting was done.

The parties inspected three places where ore is to be found. At the M., K. & T. railroad bridge on Mr. Fairman's place large chunks are found which are said to have been thrown out by the graders in sinking the pit for the abutments for the bridge. Another place where it can be found is on the river bank where the high water has washed out large amounts of it. Near the river bank is an old abandoned coal shaft that was sunk more than twenty years ago. In the earth and rocks thrown out can yet be found abundant traces of zinc and lead, and the old settlers remember that a peculiar rock containing some mineral was being taken out at the time the shaft was abandoned. In the bottom of a ravine leading to the river, about on the level with the bottom of the abandoned shaft, evidences are also seen of the same rock.

No prospecting has yet been done, but leases have been obtained and the matter will be thoroughly tested; and if the ore is found in quantity and quality suggested by the cropping it will be a rich find for Ft. Scott.

INCREASING USE OF FLUOR SPAR IN METALLURGICAL WORK.

Some time ago Dr. Foehr, a noted German chemist and metallurgist, called attention in an article in the *Chemical Zeitung* to the growing tendency to return to the use of fluor spar as a flux in metallurgical operations. He stated that until the beginning of this century fluor spar was considered indispensable, but was replaced to a large extent by limestone, on account of its being apparently much cheaper. The two fluxes, however, are so different in their action, even when accomplishing somewhat similar results, that no comparison is just when based merely on the relative price per ton,

In the United States fluor spar has probably never been used to the same extent as in England and on the continent, and for this two reasons may be assigned; the lack of information as to its value and the proper manner of using it to obtain good results, and the uncertainty of the supply. This latter cause no longer exists, as extensive and more worka

to parts of limestone. The fluor spar reduces the quantity of fuel required, forming but two parts of slag where limestone forms three, and it is probable that it forms fluorsilicate, whereby heat is likely to be liberated. When it is blown into the tuyeres it forms an energetic solvent. In the manufacture of ferro silicon, an iron coating 10 percent Si may be obtained in an ordinary blast furnace from siliceous ores if fluxed with fluor spar and the slag is strongly basic. The fluor spar first reduces the silicon energetically, forming fluorsilicon, and this is then reduced to silicon by the hydrogen of the furnace gases and possibly also by the coke. A peculiarity of fluor spar is its property of reducing the most different bodies, it being also advantageous in the manufacture of spiegeleisen, using a manganese combination and fluor spar. In this case a very basic slag, rich in fluorides, is desirable. In basic open-hearth steel plants in the United States the use of fluor spar is steadily growing, its main function being to render more fluid the slag, not only on the hearth, but in the ladle and mold as well. In the Krupp and Rotlet

methods of dephosphorizing pig in basic-lined cupolas fluor spar is used to carry phosphorus into the slag.

In foundry work the value of fluor spar as a fluxing agent seems to have been discovered first by the manufacturers of chilled car wheels. Unlike chill rolls, car wheels are cast from iron melted in a cupola. While limestone is used in cupola work, its function is merely to slag off the ashes of the fuel. It has no important chemical action on the iron, excepting the unfortunate one of tending to slag the silicon. Fluor spar, while accomplishing all that limestone does in fluxing off the ashes with a smaller quantity, has an im-

portant effect on iron, keeping it gray and soft by holding the silicon as an alloy, while it tends to carry some phosphorus and sulphur into the slag. In such work as the manufacture of car wheels, where a low silicon iron is necessary, the advantages of fluor spar have been first appreciated, but in other work its use may be very advantageous, permitting the use of a greater amount of scrap without unfavorably affecting the melting ratio, and permitting also the use of lower grades of iron for melting. It is a curious fact, however, that the favorable effects of fluor spar do not increase indefinitely as the quantity used is increased. The best results seem to be obtained when about one-third of one per cent is employed, while beyond one-half per cent the results are distinctly inferior for certain classes of work, one reason for which is that the larger quantity of fluor spar tends to hold manganese contained in the iron from slagging. In other classes of work much larger quantities of fluor spar may be advantageously employed to reduce the quantity of slag and make the iron more fluid. In



SCENE IN LEAD AND ZINC MINING DISTRICT, EMPIRE CITY.

ble deposits have lately been opened up.

The use of fluor spar in Metallurgical work may be considered under three heads: (1). In the blast furnace, especially for the production of ferro silicon and ferro-manganese; (2). In the open-hearth steel furnace, especially with the basic process, to make more fluid the slag, to help carry off phosphorus, and to reduce the sulphur; (3). In the foundry cupola, to make the iron more fluid, permit the use of greater quantities of the lower grades and of scrap and to reduce impurities.

In the blast furnace, the smelting of very refractory ores is almost impossible without fluor spar. But even with good ores, there are advantages in the use of fluor spar which do not appear at first glance. Thus the reactions of fluor spar and limestone respectively are as follows:



These formulas show a quantitative economy in favor of fluor spar of 300 to 156. But Dr. Foehr, who has already been quoted, claims that one part of fluor spar goes farther than

English foundries the use this flux is much more common than in the United States.

Until recently the only worked deposits of fluor spar in the United States were located in Southern Illinois. The supply was very uncertain at times owing to water in the mines and poor roads. Lately very valuable and extensive beds of almost pure fluor spar have been opened in Kentucky.—*Age of Steel*.

CORRESPONDENCE

NEVADA.

SILVER PEAK, NEVADA, Oct. 18th, 1898.

EDITOR JOURNAL:—In an issue of the JOURNAL (October 1st), an article was printed about Silver Peak Hills which was not altogether truthful. The fact of the matter is, Sam Case is working on the Homestake, but no paying rock has been found as yet. There are a couple of Indians at Jagels' place breaking up the waste rock. Jagels himself shows up occasionally.

Archie Valencia has secured a lease from J. Chiatovich on the Bourbon mine and is working that property alone, and not with anyone else. He has not struck any pay-ore yet.

Peter Shannon, known as "Pretty Pete," is in good luck. A few weeks ago he struck a prospect out of which he expects to make a good stake. The ore is full of coarse and fine gold.

Mr. C. H. King of San Francisco is in camp. He came here to see the John Chiatovich property, known as the Mary mine, and Bourbon mine, together with a 10-stamp mill and cyanide plant. It is now also his intention of purchasing Mr. Chiatovich's ranch at Fish Lake, 28 miles from here, which covers over 2,000 acres. It is expected that if the deal is consummated he will put in improved machinery and work the ores on an economical basis and thereby make this camp lively.

I remain for today, I. X. L.

UTAH.

SALT LAKE CITY, Oct. 21, 1898.

EDITOR JOURNAL:—The Utah mining stock market this week was satisfactory as to prices and volume of business, which was unusually heavy. The controlling interests of the market are arrayed on the bull side, and such stock is being taken in turn and pushed upwards. I do not look for any immediate reaction, but it is well to take a conservative view of existing conditions. In the end only legitimate values will stand.

Ajax held at last week's figures. Anchor eased off a little. Bullion-Beck paid its dividend of \$10,000 on the 15th. The property continues to ship its usual quota of ore and conditions on the lower levels of the mine are more favorable. The stock was a trifle weaker. Centennial-Eureka was a shade higher. For a long time held, pending the decision in regard to a mill to be built or bought, the stock is a buy around \$30. Chloride Point was stronger. The mill is now handling forty tons of ore daily, and the weekly cyanide shipments amount to about \$2,000.

Daisy continues to be bought for investment. Four new tanks have been added to the mill and about 150 tons of ore will soon be treated daily. Dalton has not changed much in price. There is no demand for Dal-

ton & Lark and developments at the mine do not warrant any particular activity. Daly was in slight demand. There was no change in Daly West quotations. Dexter continued its upward movement to \$2.75, and from that point reacted and closed today at \$2.65. The talent predict that the stock will sell at \$3 before November 1st. The company shipped to the smelters this week twelve tons of ore that averaged \$500 per ton in gold—\$6,000 for the lot. The demand for Eagle and Blue Bell continues. Work will be pushed as soon as the new machinery is in place. The sensational performance of the Grand Central will very likely be repeated in the Eagle and Blue Bell.

Four Aces advanced rapidly on heavy inside buying. The stock sold a week ago at 7½ cents and closed today at 30 cents. The cause was the report of a strike of good ore on the 750-foot level. Galena's assessment is now delinquent. I hardly think the new ore developments quite as satisfactory as was first reported. Geyser-Marion was a trifle stronger. Experts are now examining the ground to determine the amount of ore extracted from the Geyser claim. Grand Central holds up well. Shipments are regular, and the ore continues high-grade. The shares pay 21 per cent. annually upon present selling price. It is thought in some quarters that as soon as the new hoist is placed in position and shipments from the mine are increased that the dividend will be \$50,000 monthly instead of \$31,250 paid at present.

The report that the Joe Bowers vein was widening out produced an active demand for the stock which doubled in price in three days. An option of five cents per share has been given for the control of the Little Pittsburg. The ground ought to show good values with development work. Mammoth barely held at last week's figures, but the buying has been unusually heavy and for accounts of those who best understand the conditions at the property. If present values of the new vein hold up, the stock should touch much higher figures, due to increased earnings. Mercur paid its dividend of \$25,000 on the 20th. This carries the total to \$1,191,000. The stock was not at all strong. The superintendent of the mine in a recent interview stated that he believed there are 2,000,000 tons of ore in sight in the Mercur property. Ontario continues in good demand. Overland is being given an occasional quotation. The showing at the mine is said to be all that could possibly be desired. Omaha was a ready seller above 60 cents.

Sunbeam was rather soft. Silver King held at \$30, thus establishing a selling price of \$4,500,000 for the entire property. Sacramento was decidedly stronger. The regular dividend of \$5,000 will be paid on the usual date. Sunshine eased off from last week's figures, but the stock is sure to make higher quotations shortly. Swansea was steady and in demand. South Swansea held at last week's figures. Utah was dealt in limited lots. Valeo was stationary with but a limited amount of stock offered.

Miscellaneous Mining News.

ALASKA.

A new strike in the Atlin Lake region shows that district to be the equal of the Klondike in placer gold deposits, if the future shall show the news to be supported by facts.

There is a vast country around the new dig-

gings, and particular to the north, that has not only not been prospected but has never been explored. Even the Indians knew little or nothing about it; they prefer to remain in the more open country around the lakes and to the eastward.

The ground lays so as to facilitate workings and fair prospects have so far been found on nearly all the creeks. Reports also tell of the finding of some good claims in the unprospected region north and east.

There will doubtless be considerable travel in and out of the new diggings all winter owing to their proximity to the coast. They are now only about 100 miles distant.

ARIZONA.

Superintendent F. J. Martin of Fortuna, who was in Yuma last week, states that the cyanide experiments which have been recently conducted with a view of determining the best methods for the treatment of the immense pile of rich tailings at Fortuna, have demonstrated the superiority of the percolation method. Mr. Clay Garrard, the company's assayer, who has conducted the experiments, is thoroughly versed in his profession, and his efforts have produced good results.

It is rumored that the Cedar Valley Mining Company will soon inaugurate work on their Cedar Valley property in Mohave county on an extensive scale. The property is an excellent one and properly managed will pay big dividends.

CALIFORNIA.

AMADOR COUNTY.

The Gover Mill.

The Gover mill at Dayton was burned to the ground October 13th, together with the retort-house. The particulars of the fire have not come to this office, but it is supposed to be of incendiary origin. This is the third mill burned in that neighborhood in a short time—the Bunker Hill of forty stamps, the Cosmopolitan of thirty stamps and now the Gover of twenty stamps. All of these were idle when destroyed.—*Amador Ledger*.

CALAVERAS COUNTY.

J. Burns is running a tunnel to get under the old workings on what is known as the old Fisher lead. Twenty-five years ago a shaft seventy feet deep was sunk with whim power, but at that depth so much water was encountered that the property was abandoned and has lain idle ever since. Those in position to know say there is an excellent body of ore in the bottom of the shaft and predict success to the owner.

INYO COUNTY.

One million dollars of Pittsburg capital is to be invested in gold mining in Inyo county, California, and Lincoln county, Nevada, gold fields. This was made plain last week when the announcement was made that the Meneva Mining and Milling Company, made up of Pittsburg business men, had been incorporated under the laws of the state of New Jersey.

The president of the new company is C. C. McCarthy, commercial agent of the Missouri Pacific railroad at Pittsburg, while W. W. Hammond, freight agent of the same road, is secretary and treasurer. William Lohmeyer, a well-known Pittsburg business man, is named as vice president.

KERN COUNTY.

The new concentrator mill for the Hard Cash, arrived at Randsburg, Oct. 13. The foundation is all ready and they began hauling out lumber last week.

MONO COUNTY.

The Standard Consolidated Mining Company's 20-stamp mill at Bodie, Cal., was totally destroyed by fire the last of September. The fire started in the boiler room. The adjoining offices and the cyanide plant were saved. The estimated loss is \$50,000; partially insured.

SAN BERNARDINO COUNTY.

A San Bernardino paper says Monroe Stewart and Z. B. Stuart have returned to San Bernardino from their trip to Eagle Mountain, where the parties who have the bond on the Iron Chief are at work. Stewart is one of the owners of that valuable property and, after inspecting the progress of the work, says he would not be sorry if the bond was not fulfilled, and he could again claim his share in the mine, which is proving very rich. He also brought in with him a specimen of marble, which was taken to Stone Bros. to be polished and they pronounced it a magnificent bit of rock.

SAN DIEGO COUNTY.

E. E. Bowles, who was for many years engaged in the newspaper business at San Diego, has organized the Royal Group Gold Mining Company with a capital stock of \$2,000,000 to work his group of claims at Canon Springs, on the desert, eighteen miles northeast of Salton.

According to the deeds filed in the County Recorder's office at San Diego, the Pacific Bank of San Francisco, which owned a half interest in the Helvetia mine at Julian, has sold its share to C. H. Duns Moor, who was formerly State Bank Commissioner, for \$10,000, and Mr. Duns Moor has transferred the property to Edward W. Sebben for \$6,000. Mr. Sebben is one of the three Denver capitalists who have entered into a contract with the mine's owners to give it a six months' trial, and should the mine prove satisfactory at the end of that time they will purchase the same. The other half interest in the mine is owned by nineteen parties, who are represented by W. H. Holcomb and H. S. Utley.

SISKIYOU COUNTY.

The copper mine in the Cottonwood district of Siskiyou county, on which considerable development work is being done under the supervision of John Davenport, is reported as showing up continually improving prospects.

TUOLUMNE COUNTY.

At the world-famous Rawhide mine the main shaft has reached a depth of 1500 feet, at which point miners are now engaged in cutting out a station, after which drifting will be prosecuted both ways on the vein. The vein is large, as usual, holding steadily from 30 to 35 feet wide, and looks first class from wall to wall. The 40 stamps of the mill are hung up but will soon be set dropping. Everything is in readiness to receive power from the new electric plant.

COLORADO.

Dividends.

Dividends distributed by Cripple Creek companies last month amounted to \$168,000, and it was not a particularly heavy month in this connection. This was due to the fact that several of the companies are now making quarterly instead of monthly distributions, and none happened to fall during September. The list is made up as follows:
Portland..... \$ 60,000
Elkton..... 20,000
Strong..... 25,000
Anchoria-Leland..... 6,000
Golden Cycle..... 15,000
Lillie..... 9,000
Gold Coin..... 10,000
Eldora L..... 1,000
Modoc..... 10,000
Associated..... 12,000
Total \$168,000

This makes the total for the year thus far \$1,885,625, or an average of about \$509,402.77 for the nine months which are past. Next month it is expected that there will be a considerable increase, as the Vindicator alone will help it out to the amount of \$50,000, and others besides the list contained above will probably be forthcoming.

Estimates of September production show this to be the banner month in the history of the Cripple Creek district, the total reaching the sum of \$1,441,520. This is the largest production for any month since the discovery of the camp. The following are the figures on which above estimate is based:

Metalic Extraction Company, 8,400 tons; average per ton, \$20; total value, \$168,000.

El Paso Reduction Works, 4,100 tons; average value, \$30; total, \$92,250.

Gillett Reduction Company, 2,950 tons; average value, \$30; total, \$88,000.

Colorado Ore Reduction Company, 2,950 tons; average value, \$35; total, \$103,250.

Brodie, 1,840 tons; average value, \$28; total, \$51,500.

Colorado-Philadelphia, 7,000 tons; average value, \$30.50; total, \$213,500.

Total for mills, 26,890 tons; average value, \$26.66; grand total, \$706,520.

To smelters were shipped 10,500 tons; average value, \$70; total, \$735,000.

Grand total, 37,390 tons; total value, \$1,440,520.—*Colorado Springs Mining Investor*

IDAHO.

Mining men and residents of the Coeur d'Alenes are keenly interested in the suit which has just been started at Boise City by the Bunker Hill & Sullivan Mining Company against the Last Chance company and the Empire State-Idaho Mining & Development company. The latter is the company organized by F. Lewis Clark and Charles Sweeney to take over the property of the Last Chance company. The mines are at Warden, in the Coeur d'Alenes. The plaintiff company owns the Stemwinder claim, and is asserting that it holds, through this claim, the apex of the great ore body of the defendant company. The Bunker Hill owners are asking for an injunction. A delegation of Spokane mining men and attorneys has gone to Southern Idaho to take part in the case.

MICHIGAN.

Raising Pay.

The Menominee range papers state that there will be a raise in pay of ten cents per day at the Aragon mine, Norway. This is of considerable help to the employes. Even ten cents is a big help, meaning about \$30 per year. It aids in the purchasing of clothes and food. We hope to see the price of iron ore increased so there can be a substantial increase in all the mines of the several Lake Superior ranges in the near future.—*Iron Ore*.

The Crystal Falls.

The Crystal Falls mine passed the 100,000-ton mark in this year's output during the week, and there is left two months of shipping season ahead of the operators yet. Had there been plenty of labor this mark would have been passed several weeks ago, but operations have been hampered to some extent at the mine on account of the scarcity of miners. In fact they are very short at the present time and employment could be given to many more men. There will be a great amount of development work done at the Corrigan, McKinley properties this winter and miners of the town need have no fears but that there will be plenty of work there this winter, as Corrigan, McKinley & Co. alone intend employing 300 men.

MISSOURI.

Capitalists of Pittsburgh and Washington, Pa., have purchased for \$100,000 the Teal tract of land of 120 acres, southeast of Prosperity. The land adjoins the celebrated Tenderfoot and McKinley mines. The following are the owners: Geo. L. Walter, W. B. Neal, J. M. Guffey, E. N. Dunlap, John W. Ely, J. F. McFarland, C. Reed and H. V. Cruril. The official are: Geo. L. Walter, president; W. B. Neal, vice-president; H. V. Cruril, secretary and treasurer. H. M. Cruril will look after the development of the land.

MONTANA.

It is rumored that J. P. Hardy, Wm. Deadmond and H. H. Meanor have struck it rich on the Cannon property, at Winston, Jefferson county, on which they have recently taken a lease for two years and a bond for \$25,000, says the *Helena Independent*. The leasers left the old tunnel, where the property had formerly been worked, and began prospecting on the hill a short distance above. Scarcely had they penetrated beneath the surface when they encountered a two-foot vein of galena ore of great richness. The vein has been uncovered a distance of 20 feet and the leasers are confident that they have one of the best things in the country. It will be remembered that the credit for the recent strike at the Little Bonanza was due to the well planned development work of the same men.

Henry Albertson has returned to Butte from Top o'Deep, a quartz and placer mining district located about 20 miles from Drummond, where he went a few weeks ago to make an inspection of some placer ground in which he holds an interesting interest. Owing to the high altitude of that section the weather has been cold and the work of washing out gold has consequently been interfered with. It was the intention to have made a clean-up several days ago, but ice formed so

rapidly that the task had to be postponed pending a thaw. The result of the summer's work has, as a whole, been satisfactory, says Mr. Albertson.

NEVADA.

Work in the Diamond mine, near Eureka, Nev., has been suspended and the mine closed down, throwing about 60 men out of employment.

Cherry Creek Ore Strike.

Fulfilling its pledges, the management of the Star mine, at Cherry Creek, Nevada, have marketed with Salt Lake smelters ore containing as much as 3000 ounces of silver per ton. In early days the production of ore of this class was not an unusual thing, and, while it does not appear in such abundance as in years ago, the high grade chute is every now and then recovered on the lower levels. Manager Stalman says in its palmy days the Star was productive of dividends aggregating many millions of dollars, and that it will be restored to the column of dividend payers. A mill will be erected at a point six miles north of the mine and will have a daily capacity of 150 tons.

Experiments that are now going on in Salt Lake City, under the direction of Professor Orr, the cyanide expert, will determine just what process is to be employed in the reduction of the ores at Cherry Creek, and results are expected in the next few days that should enable the company to act. The samples on which experiments are being made show a fine general average in gold, in addition to some silver, and the proposition promises to become as lucrative as any of the number the big company has in hand.

NEW MEXICO.

Output Hillsboro Mines.

Output of Hillsboro gold mines for the week ending Thursday, Oct. 13th, 1898, as reported for *The Advocate*:

	TONS
Wicks.	25
K. K.	20
Richmond.	35
Snake Group.	65
Opportunity.	25
Sherman.	5
Cincinnatian.	20
Trippe.	75
Rex (silver-lead)	10
Total.	280
Total output since January 1, 1898—	6,870.

OREGON.

The Isabel Mining Co. Incorporated.

The Isabel Mining Company was duly incorporated under the laws of Oregon, on Oct. 7, 1898. The incorporators are Chas. Cook, of Glendale; P. S. Anton and Lincoln S. Heafield of Chicago, and Rufus Mallory and Mr. Mallory, jr. of Portland. Capital stock \$30,000 in 300 shares of \$100 each, fully paid up. The claims of the company are located at Tunnel 6, at Glendale, near the Victory Mine. The company will order at once a 20-stamp mill with shafting and power for 60 stamps, also concentrators and a chloride

plant. They have very rich and promising mines, embracing a group of 14 claims in the same mineral belt as the Gold Bug and other properties recently purchased by Senator Jones & Co., of Nevada.—*Oregon Mining Journal*.

SOUTH DAKOTA.

Another very rich strike of ore has been made in Pennington county, one of the richest and largest ever made in the southern Hills has just been uncovered in the Sunnyside mine of Hill City. It is a close rival to the Holy Terror of Keystone. The shoot of about eleven feet wide and it is uniformly distributed with free gold. We are informed by indisputable authority that the ore in the shoot carries a value of \$50 to \$100 a ton free gold, and that the general average is about \$75. If this be true, it is one of the richest things the Black Hills has ever seen. The shoot is large, and has the appearance of being a true fissure, which are the two most necessary things for a permanent mine. It is unquestionably the most important result of development work in the Southern Hills. The fact has been demonstrated again that the verticals of free-milling ore hold their values with depth.—*Black Hills Mining Review*.

TEXAS.

Llano Mineral District.

Prof. Arthur A. Stiles, civil engineer and member of the United States Geological Department, who has been in Austin, Texas, several days with teams and camping outfit, left October 14th for the Llano mineral district. The recent discoveries of gold and silver bearing quartz in that section and the prevalence of the precious metals with the bases ores, has induced the government to order a thorough geodetic and geological survey of the whole district. After the preliminary lines have been established Prof. Robert T. Hill and Prof. Willis will devote their whole attention to the work until it is completed. These gentlemen have been in the employ of the geological department of the United States government for many years and have made surveys and maps of nearly all the mineral and coal-bearing regions from the Atlantic to the Pacific oceans.

In past years the state undertook this work, but owing to meagre appropriations, very little was accomplished, except the establishment of the fact that almost all kinds of minerals in more or less quantity exist there. Pack Saddle Mountain, between the Llano and Sandy River, will be one of the starting places in making the survey. Prof. Stiles is a graduate of the University of Texas and is thoroughly equipped for the important work.

UTAH.

Bullion Beck Co. of Eureka paid their regular dividend of \$10,000 on the 15th of October. A number of Boston, Mass., stockholders of the Chloride Point Gold and Silver Mining Co. of Mercur were in Salt Lake City last week having made an examination of that company's property.

The management of the Eagle and Blue Bell mines of Eureka is engaged in putting the workings in shape for energetic operations, and a new air compressor with power drills will be placed in the mine to facilitate rapid work.

Water has been encountered in the lower

levels of the Four Aces silver and lead mine of Silver City. The silver-lead property at Fish Springs of the Galena Co. has recently opened up a body of high-grade ore, and the manager, who has been there for the last few days, will soon send in his report, and the public will then know the character of the ore.

The Grand Central Mining Co., with properties at Mammoth, has paid its regular dividend of \$31,250 on the 10th of October. The mine is looking well.

The report of encountering ore on the 600-foot level of the Mammoth mine, at Mammoth, Utah, and at a point which would indicate a continuation of the famous Betsey stope, that in former years was productive of such phenomenally high-grade ore, caused the stock of the Mammoth to seek the ascendent, and at a rapid rate. No official confirmation of the strike has been made.

Mercur declared its regular dividend of \$15,000 on the 10th of October, and stockholders of record on that date received the dividend on the 20th of October. The work of placing the new tanks in position at the mill in Mercur, Utah, is progressing rapidly.

Parties have been endeavoring to get hold of the stock of the Sunshine Gold Co. of Sunshine, Utah, for a few months back and have secured all the floating stock. Should the deal now under consideration be consummated, work will be resumed at the properties, and great results may be expected.

WASHINGTON.

Republic Camp.

The Republic is shipping ore as usual, the mill being fully supplied, as well as all the freight wagons available. The output for September afforded ample means for the October dividend. Machinery for the mill is en route from the railroad. It will be put in place as fast as it arrives.

The shaft on the Bryan and Sewell is down 126 feet. The quartz has passed out to the west, but will be caught again in the drift, which will be started from the 150 foot level.

The cross-cut on the Knob Hill is in 50 feet. The rock is growing softer, some water is making its appearance. It is believed the ledge will soon be cut.

A new contract on the tunnel on the Golden Harvest has been let and work is progressing favorably, with the ledge making a good showing.

Some dead work is being done on the Blacktail. There is nothing new to report.—*Spokane Miner and Electrician*.

FOREIGN MINING NEWS

BRITISH COLUMBIA.

September Ore.

The *Kootenaiian* of Kaslo publishes the following regarding the ore shipments for September:

"September was not a record shipping month with the mines of the Slocan, though the record is by no means a bad one. A number of big shippers are undergoing development which accounts for the month not coming up to former months. Throughout the country there is great activity and the mines are described as never looking better. The

continued firm price of lead and silver is having a marked effect.

During the month the following mines shipped via Kaslo:

	Pounds
Ruth.....	720,000
Payne.....	700,000
Last Chance.....	320,000
Slocan Star.....	360,000
Rambler Cariboo.....	90,000
Antoine.....	60,000
Whitewater.....	40,000
Treasure Vault.....	40,000
Bismarck.....	39,250
Miller Creek.....	30,000
Wonderful Bird.....	12,800
Montezuma.....	12,000
Total pounds.....	2,424,050

This ore was divided among the different smelters and purchasers as follows:

Pueblo.....	1,630,000
Everett.....	510,000
Kaslo.....	154,050
Tacoma.....	90,000
Omaha.....	40,000
Total pounds.....	2,424,050

The ore cleared at the port of Kaslo for shipment during the month of September appears in the records as follows:

KASLO.

Total Pounds.....	4,309,840
Total Value.....	\$110,959
Ounces Silver, Contents.....	132,160
Pounds Lead.....	1,327,010

NAKUSP.

Total Pounds.....	4,309,840
Value.....	\$193,419
Ounces Silver, Content.....	220,303
Pounds Lead Contents.....	2,184,712

It will be seen from the above that during the month nearly two-thirds of the Slocan's output went out via Nakusp. We have no record of the mines shipping other than via the K. & S. Considerable ore went over the Slocan branch. The shipments via Kaslo and Nakusp show the output of the Slocan for the month to have been at least 6,733,890 pounds or about 3,366 tons.

The shipments via the K. & S. and Kaslo for the first two weeks of October down to and including the 12th, were as follows:

Mine	Destination	Pounds
Payne.....	Pueblo.....	400,000
Ruth.....	Pueblo.....	100,000
Ruth.....	Everett.....	91,000
Slocan Star.....	Pueblo.....	240,000
Last Chance.....	Pueblo.....	200,000
Antoine.....	K. O. Co.....	30,000
Stranger.....	K. O. Co.....	2,540
Total.....	1,070,540 pounds or 535 tons.	

LOWER CALIFORNIA.

The steamer St. Denis cleared last week at San Diego for Ensenada and San Quintin with the biggest cargo of the year, the principal item being a quartz mill and outfit for the Ybarra Mining and Milling Company at Calmali, and valued at \$2,000. A gentleman who returned from San Francisco and who went down on the steamer said:

"The Ybarra Company has decided to resume operations on its gold mine at Calmali in real earnest and that a lot of money is going to be sunk there right away, getting things into shape to do business. A ten-

stamp quartz mill has gone down, and a lot of other machinery will follow in a few days. The company knows the property is rich and proposes to see if some of the riches cannot be gotten out of it."

GENERAL NEWS

Acetylene Gas.

Numerous inquiries from subscribers regarding acetylene gas has induced us to reproduce the following article on the adaptability of acetylene gas for explosive engines, by Gardner D. Hiscox, M. E., in his work on Gas, Gasoline, and Oil Vapor Engines, published by Norman W. Henley & Co., of 132 Nassau street, New York, N. Y. The work is considered an authority on the subjects treated, and we believe anything found therein can be relied upon as absolutely correct.

"Much interest has been lately shown and some experiments made in regard to the availability of carbide of calcium for generating acetylene gas as a fuel in the motive power of the horseless carriage and launches. Liquid acetylene has been also suggested as the acme of concentrated fuel for power.

The gas liquifies at 116° F., at atmospheric pressure, and at 68° F. at 597 lbs. per square inch. Its liquid volume is about 62 cubic inches per pound.

The specific gravity of gaseous acetylene (C_2H_2) is .91 (air) and its percentage of carbon .923 and of hydrogen .077. Its great density as compared with other illuminating gases, and the large percentage of carbon is probably the source of its wonderful light-giving power.

It is credited by hydrocarbon values at 18,260 thermal units per pound of the gas, (14½ cubic feet) and 1259 thermal units per cubic foot.

One volume of the gas requires 2½ volumes of oxygen for perfect combustion, which is equivalent to 12½ volumes of air, provided that all the oxygen of the air can be utilized in the operation of a gas engine; probably the best and most economical effect can be had from the proportion of 1 of acetylene to 14 or 15 of air. This proportion has been used in Italian motors with the best effect.

One pound of calcium carbide will yield 5¾ cubic feet of acetylene gas and requires a little over a half pound of water to completely liberate the gas, so that where weight is a factor, and with carriage, tricycles, and bicycles the output of gas will be but 3.83 cubic feet per pound of generating material. The large proportion of air required for perfect combustion makes a favorable compensation for the necessity for carrying water for generating the gas, as compared with gasoline, which yields but 2.8 cubic feet of vapor per liquid pound with the best explosive effect of 9 volumes of air to 1 volume of vapor.

In liberating the gas from carbide in a close vessel the pressure may rise to a dangerous point, depending upon the clearance space in the vessel, say from 300 to 800 lbs. per square inch. In this manner a few accidents have occurred.

One pound of liquid acetylene, when evaporated at 640° F., will produce 14½ cubic feet of gas at atmospheric pressure, or a volume 400 times greater than that of the liquid. Its critical point of liquefaction is stated to be 98° F.; above this temperature it does not liquify, but continues under the gaseous state at great pressures.

The heat unit value of acetylene gas, from

its peculiar hydrocarbon elements, it will be seen, is far greater than that of gasoline vapor per cubic foot, but experiments seem to have cast a doubt upon the theoretical value, and assigned a much less amount, or about 868 heat units per cubic foot.

As the comparative volume of explosive mixtures of gas or vapor and air is largely in favor of acetylene over gasoline, and as the weight of material for a given horse power per hour also favors the use of acetylene, it will no doubt become a useful and economical element of explosive power for vehicles and launches; always provided that the commercial production of carbide of calcium becomes available as a merchandise factor in cities and towns.

The explosive mixture of acetylene and air spontaneously fires at lower temperatures than illuminating gas mixtures; it varies from 509° to 515° F., while illuminating gas mixtures range from 750° to 800° F. Claims of a higher temperature have been made.

In the use of liquid acetylene, the cost of liquefying the gas may be a bar to its ordinary use, but for special purposes there are possibilities that only future experiments and trials may develop into useful work from this unique element. In trials of acetylene for power in gas engines, made in Paris, France, it was found that a much less volume of acetylene was required for equal work with illuminating gas, and that it was a practical explosive fuel. The only change required was found to be a more perfect regulation of the valve movement, or a smaller valve to meet the smaller volume of acetylene. In these experiments the explosive mixture was approximately 10 parts air to 1 part acetylene, and using from 4 to 7 cubic feet of gas per horse power per hour.

From another account of trials made in France, it appears as the result of experiments made by M. Ravel, that 6.35 cubic feet of acetylene gas generate 1 horse-power per hour, which is equivalent to a reduction of two-thirds as compared with petroleum. As to the explosiveness of mixtures of air and acetylene, it was found that 1.35 parts of this gas mixed with one (1) part of air began to be explosive, the explosive force of such a mixture rising rapidly as the dilution with air increases, attaining finally a maximum when there are 12 volumes of air with 1 volume of acetylene; then, as the proportion of air is increased beyond this limit, the explosive force subsides, until at 20 to 1 it becomes entirely extinct. The flashing point approximates 900° F., whereas in the case of most other gases used to generate power, the requisite ignition temperature is about 1100° F. The temperature of combustion is very much higher than that of the other gases with which it can be compared. The special characteristics of this gas, therefore, are great rapidity of the transmission of flame, low ignition temperature and extraordinary energy evolved in the explosion.

The neat appearance of the *Black Hills Mining Review* deserves comment. The last issue comes out with an elegant colored cover and two extra reading pages, which we hope will be a permanent feature to that enterprising publication.

Detroit Lubricator, No. 400,000 was completed on September 1st last, and was shipped out next day, with a quantity of others, to South Africa. The other 399,999 are scattered all over the globe, "lubricating the world's machinery," as the makers say.

THE DEVELOPMENT OF THE CYANIDE PROCESS.*

By WM. ORR.

Five years ago the total cyanide mills in America would not exceed five or six in number, and today, I am conservative in stating, there are over fifty plants in the United States employing the MacArthur-Forrest cyanide process. Take the State of Utah for example. In 1893 there was only one cyanide mill in operation, namely, the famous old Mercur mill, with the history of which almost everyone is familiar, and today there are in operation, or in course of erection, no fewer than fifteen cyanide plants within the boundaries of the State. In Camp Floyd, commonly called Mercur district, alone, there are ten cyanide plants, and as this district is dependent entirely on the cyanide process for its ore reduction, I will give you a brief sketch of the methods which have been employed and the difficulties which I (as the representative of the MacArthur-Forrest Co.) have encountered in the reduction of the ores of this district by means of cyanide. The ore is principally an altered or silicious limestone, which can be easily pulverized; in fact, this feature of the ore was the cause of the first difficulty encountered by the pioneer operators. Fine crushing was entirely out of the question, for this ore as the fines thereby produced retarded or entirely stopped the circulation of the cyanide solution. Here the extremely porous character of the ore came to the assistance of the millman, enabling him to leach the ore in a coarse condition, (from a $\frac{1}{4}$ -inch to a $\frac{3}{4}$ -inch mesh) when he would otherwise have been driven to employ agitation and decantation as his method of extraction, instead of the simple and economical method of percolation. Beginning by crushing the ore to 10 mesh, which was found impracticable, the mesh has gradually been raised until $\frac{3}{4}$ -inch mesh has been reached in some cases. From $\frac{1}{4}$ -inch to a $\frac{1}{2}$ -inch mesh, however, has been found to yield the best results.

It is impossible to fix a definite mesh for all the mines in the district, as they vary considerably in character, some—such as the Geyser-Marion and Brickyard, being much more silicious in character than the Mercur, Sacramento and Sunshine. Four or five years ago it was considered necessary to leach the ore at least four days, but this was eventually found unnecessary, and the time has been reduced to from forty-eight hours to seventy-two hours, and may in some cases reach eighty-four hours with talye ores. It is a remarkable fact that the gold in the ore in this district can be entirely brought into solution in fifteen minutes under favorable conditions, such as by agitation at 10 mesh, so that on a commercial scale the time taken in obtaining a satisfactory extraction is chiefly required in actually washing out or displacing the first solution, which, from experiments I have made, I conclude, must have dissolved the greater part of the gold. The strength of cyanide solution employed has also been greatly reduced, and now the strength generally employed varies from .01 to .02 of 1 per cent, and I have even seen a solution containing .001 of 1 per cent produce an excellent extraction; but the precipitation with this solution was imperfect until the solution was restrengthened. The result of this change in the strength of the cyanide solution now employed from that used five

years ago, namely, $\frac{1}{2}$ of 1 per cent to 1 per cent is a great reduction in the loss of cyanide and therefore in cost. A great saving in the loss of cyanide in some cases has also been effected by the addition of lime, thereby neutralizing the acid salts deleterious to the cyanide, and which occur principally in the surface ores; in fact, on one occasion I experienced the total loss of the cyanide in solution, and, on investigation, found it was due to the presence of some surface ore from a new ore elute, the ore from which contained a large amount of acid salts. On testing this ore I found the loss of cyanide, without the addition of lime, was nine pounds per ton; with lime added, three-quarters of a pound per ton. Without careful attention, an occurrence of this kind will result in a heavy loss of gold in the tailings, if the trouble is not speedily located and overcome. The acidity in the Mercur oxidized ore is principally due to acid iron, aluminum and magnesium salts, which can be neutralized to a large extent by the addition of lime. This lime is charged into the tank, the quantity used being from one to two pounds lime per ton of ore. The lime is generally prepared by the method known as dry-slacking; that is, taking the quick-lime and adding only sufficient water to reduce the lime to a fine, dry powder. Thus prepared it is easily powdered and presented in a very efficient form. The exact amount of lime necessary requires careful calculation, as either an insufficient supply, or an excess, will give disappointing results.

The consumption of zinc, like that of cyanide, has likewise been greatly reduced within the last five years, and now only from one-quarter to three-eighths of a pound is consumed per ton of ore treated. Judicious handling of the lime has an important bearing on the consumption of the zinc.

The surface or oxidized ores of the Mercur district, however, present few difficulties, but occasionally a pocket of unoxidized ore will find its way into the tanks and therewith make its presence felt in a most objectionable way. This unoxidized ore contains the following minerals which affect the solution, namely native sulphur, the arsenic sulphides (regular and orpiment), ferrous arsenide compounds, and occasionally a certain kind of shale. No chemist could suggest a more deleterious mixture for effectually checking the solution of the gold. The alkaline cyanide solution, acting on the sulphur and sulphides, produces a soluble alkaline sulphide, in presence of which no gold can be dissolved. The cause of this is easily explained. Gold to be dissolved by a cyanide solution requires the presence of oxygen in that solution. By the introduction of even a very small quantity of such a strong reducing agent as an alkaline sulphide, the oxygen is removed and the solution of the gold rendered impossible. Therefore, before the cyanide solution thus found by the pressure of an alkaline sulphide can be rendered effective, this sulphide must be removed, either by oxidation to sulphate or precipitation as an insoluble sulphide. The ferrous compounds in the base ores are also extremely injurious, but act in a different way from the sulphides, by conversion of the cyanide into ferrous cyanide, which, for all practical purposes, is a non-solvent for gold. Another occasional constituent, the shale, acts in a similar manner to the sulphide, namely, as a reducing medium, thereby rendering the solution ineffective. This shale has also the property of precipitating gold already in solution through virtue of the carbon it contains. I have taken a solution as-

saying \$11.60 per ton, and after circulating it through some of this pulverized base ore for twenty-six hours found it then assayed only \$9.20. It will thus be seen that the base ore of the Mercur district is a hard combination for the cyanide process. I have found the entire stock of solution in several of the mills being run to waste, because, according to the millman, "it had become fouled by arsenic." I have shown by the above that this is partly an erroneous idea, as the arsenic, while present, is not the real cause of the trouble. The sulphur, in combination with the arsenic, the ferrous iron, and the carbon in the shale are the causes. I have treated an ore containing over 3% per cent of arsenic with satisfactory results, but the arsenic in this case was carried in the minerals scorodite and haidergerite—oxidized varieties of arsenic minerals. In fact, arsenic is present at all times in the cyanide solution in the Mercur district, and is precipitated to a certain extent on the zinc with the gold.

(To be Continued.)

THE REDUCTION WORKS FOR SILVER ORES AT ADUANA, SONORA, MEX.*

By MILTIADES TH. ARMAS,
Formerly Ass'tant Superintendent

The Quintera mine of the Alamos district in Sonora, is a powerful silver-bearing lode, known as the "Quintera" lode, and today is the only one in that section of the country which, notwithstanding the complexity of the ore, is worked profitably.

With a general course nearly due north and south, and dip of 16° from the vertical towards the west, this lode traverses the crest of the Quintera Mountain.

Flanked east and west by higher and more rugged peaks, this mountain forms the divide, or pass, over which a bridle path connects the mining towns of the two leading mines, viz., Aduana on the northern side, where the reduction works of the Quintera mine are situated, and Promontorios on the opposite side, with the reduction works of the Almado and Tiriti mines.

The population of Aduana, Promontorios and the neighboring settlement of "Minas Nuevas" is made up of native Mexicans mostly of Indian blood.

Besides being very docile, they become excellent mine and mill operatives. The pure-blooded Indians appear to me to be the best of all.

In this part of Mexico the cheapness of labor goes far toward offsetting the evils which may be considered to attend the pursuit of mining or milling by foreigners.

Six miles from Aduana is Alamos. This is one of the most important towns in Sonora, and is connected with Aduana by a wagon road, which continues seventy miles to the port of Aguabampo, on the Gulf of California.

This brief geographical description, with some additional information concerning the system of weights and mode of transportation, will probably render clearer the description of the various methods applied at the reduction works of silver ores in Aduana.

Notwithstanding the adoption of the metric system by the Mexican Government, in all its official transactions, the people at large still adhere to the old Spanish measures.

In mining districts the unit is 300 pounds

*A paper read before the International Mining Congress, at Salt Lake City, July 8, 1893.

*A paper read before the Stated Meeting of the Franklin Institute at Philadelphia, and published in the Journal of the Franklin Institute for October.

(1 pound = 460 grams), or the weight that a mule can carry comfortably, since the principal means of transportation is by mules.

The natives speak, as a rule, of so many ounces per cargo of 300 pounds (1 ounce = 28.76539 grams.)

A description of the divers kinds of ore obtained from the same lode, with an average composition of each kind, will now be considered.

The admixture of ore is complex and varies in quality according to the relative proportions of its several minerals. All is hand-picked and hammer-dressed, and assorted into several grades, according to the degree of concentration of its metalliferous contents, or to the predominance of certain ingredients. This work is done at the mine by boys called "pintistas."

Smelting Ores.—A. Argentiferous gray copper, carrying some blende and galena. The practical yield in silver of ores of this class is from 350 to 600 ounces per ton.

ANALYSIS.

	Per cent.
SiO ₂	31.2
Cu.	11.4
Pb.	9.8
CaO	1.8
Fe	2.1
S.	10.8
Zn.	11.5
Sb.	6.3
As.	5.2
As ₂ O ₃	1.2
Ag.	2.4

B. Black Ore Prints II. A complex variety, made up of galena, blende, copper glaue, chalcopyrite, with arsenical and antimonial sulphides, all more or less argentiferous, and containing occasionally some staphanite. Their yield in silver is from 200 to 400 ounces per ton.

ANALYSIS.

	Per cent.
SiO ₂	41.4
Cu.	11.4
Pb.	9.8
As ₂ O ₃	1.2
Fe.	3.1
S.	11.3
Zn.	13.2
Sb.	4.2
As.	3.3
Ag.	1.07

C. Plomosos.—The same as black ore, *B*, but with a predominance of galena. The grade of silver in these ores is inversely proportional to the quantity of galena, and as a rule varies between 60 to 200 ounces per ton.

COMPOSITION.

	Per cent.	Per cent.
SiO ₂	33.2	33.0
Pb.	19.6	28.1
Cu.	6.8	8.0
Zn.	11.5	16.3
S.	12.2	11.1
Sb.	2.1	1.2
As.	2.6	0.9
Ag.	0.6	0.88

D. Milling Ores.—Mostly ores yielding between 48 and 72 ounces per ton, and in which the blende predominates.

COMPOSITION.

	Per cent.
SiO ₂	66.20
Al ₂ O ₃	0.30
Fe	4.00
CaO	1.80

MgO	traces
Zn	9.35
Cu	3.82
S	6.76
Ph	4.60
Sb	1.20
As	0.84
Ag	0.22

E. Concentration Ores.—Various ores, but of a tenor in silver of 23 ounces per ton, and which are never allowed to pass 27 ounces per ton.

As a rule the gangue is quartz or mother rock, mostly decomposed. The lode being a contact formation, is between two masses of rhyolite and trachyte.

The sorting of the lixiviation ore requires particular care so as to avoid all kinds of decomposed rock or gangue, which is liable to interfere in the subsequent treatment of the ore by lixiviation by forming a kind of clay impeding the rapid filtration. Pure quartz, on the contrary, is rather helpful, as we will see further on.

The reduction works are about a mile from the mine, the former being situated at the foot of the hills, and on the banks of a rushing stream, which, however, is mostly dry during the dry season. The transportation of the ore is done by mules at 18½ cents (Mexican money) per cargo.

HACIRNDA DR BIRNIVICIO—"DIOS PADRE."

The Mill.—The lixiviation and concentration ores are treated directly by 20 stamps. Ten stamps are employed for the dry crushing of the lixiviation ore.

The following are the data of the 20-stamp battery:

TWENTY STAMP BATTERY.

Stem	3" x 13' 6"	320 lbs
Tappet	147 "	"
Head	220 "	"
Shoe	120 "	"

813 lbs.

Die	75	86	"
Cam	245	"	"
Cam-shaft for 10 stamps	5 1/2" x 14' 7"	1,000	"
Cam-shaft pulley		1,650	"
Number of revolutions of the cam-shaft per minute	.54		
Number of drops per 1'		105	
Fall in feet		0' 5	
Mortar block	16" x 20" 30"	4,725 lbs	
Horse-power for 20 stamps		30	

At first the pulp passed through a 30-mesh screen, but it was noticed that the lixiviation of the chloridized ore was not rapid. The filtration becoming slow, the dissolved silver probably was reduced and precipitated by prolonged contact with the sulphides of zinc and lead, or even by their sulphates, which always occur in the chloridized ore.

It was therefore necessary to resort to a 16-mesh screen, and the results have been highly satisfactory.

The pulp is conveyed by a belt-elevator to a bin, from which the four roasting reverberatory furnaces are charged.

Roasting and Chlorination Reverberatory Furnaces.—The reverberatory furnaces are of the well-known type with four graded hearths. Dimensions: 14 x 9 feet.

The ore remains at each hearth two hours, and at the last two is continually stirred. Certain kinds of ores, especially sulphides (lately we were treating ores containing mostly blende), rich in antimony, etc., require more time, as the roasting has to be done at a very low temperature in order to avoid volatilization.

The blendiferous ores, whose analysis I

have given, required three hours at each hearth, i.e., twelve hours in total, the charge being 1,200 pounds.

At first, half of the necessary salt was added at the battery and the other half in the last hearth, but experience showed that it was better to add all the salt at the last hearth two hours before discharge.

The quantity of salt added varied between 4 per cent. and 8 per cent., according to the nature of the ores. At the beginning, when nothing but green ore (chrysocolla) had to be treated by lixiviation, a great deal of difficulty was encountered in the chlorination. Soon, however, we found that the sulphides existing with the green ore were in small quantities, and a great part of their sulphur was volatilized; consequently the sulphates formed were insufficient, and required a great deal of time to be converted into that state in order to attack the salt. So we resorted to the addition of 1 per cent. of pyrites. Pyrites, as it is well known, readily loses half of its sulphur and then is rapidly converted into sulphates necessary for the production of chlorine. Even with blendiferous ores pyrites was found to help chlorination very much. With the above-mentioned green ore and the addition of the pyrites, the time of roasting and chloridizing did not exceed eight hours, and the percentage of chlorination was on an average of 97.5 per cent. Attention should be directed to the fact that in all kinds of ores, when very siliceous, we found that the chlorination was rapid and more nearly perfect.

It can be probably ascribed to the following reaction:



The wood we preferred for the purpose was "torote" and "piojo," because they produce a large flame and have a great deal of moisture, the conversion of which into steam facilitates so much the chlorination.

Labor.—All the men employed at these furnaces are pure Maya Indians, and it can safely be said that this kind of work is their specialty.

For four reverberatory furnaces there are employed:

2 foremen at \$1.25.....	\$2.50
24 ore stirrers at 75 cents.....	18.00
10 ore chargers, wood transporters, etc. at 75 cents.....	7.50
1 salt transporter at 40 cents.....	.40
	\$28.40

The chloridized ore is discharged on a cooling floor in heaps, where the chlorination is still continued, as always some chlorine remains with the chloridized ore at its discharge.

Lixiviation—Charging the Vats.—The charging of the vats is done on contract work by four Indians. The tailings are loaded on mill dump cars and dumped into the "arroyo." The filter is repaired, and the ore that was previously slightly moistened and the lumps broken up is taken from the cooling floor and charged.

If the chlorination was properly accomplished, the ore at its discharge from the furnace will have a very strong odor of chlorine and change rapidly its color from dark brown to ochre, owing to the reduction of the chloride of iron into sesquioxide; when slightly moistened it must assume a spongy appearance, and finally when pressed in the hands it must not become muddy or adhere to the hand.

The characteristics are essential to the good

working of the lixiviation, and the Indians in charge of these works are well acquainted with these details.

This ore is charged up to the brim of the vat, because on lixiviating it will settle down to a foot or more below the brim.

There are nine vats.

DIMENSIONS OF THE VATS.

Diameter	feet, 20
Height	" 5
Height of filter.....	" "

Filter.—The filter is the well-known one, composed of stones at the bottom, with sand and gravel on top; it does not exceed one foot in thickness.

The reduction works have nine vats of a capacity varying from 37 to 47 tons, according to the nature of the ore treated.

The lateral discharge of the laxivium is preferred, as it avoids obstructions.

All the vats are in a row and their rubber discharge pipes lead to a wooden trough, which in turn carries all the silver-bearing solution to the three precipitation vats. By its side is another trough for conveying the washings of the base metals of the ore to the cementation vats for copper.

(To be Continued.)

To Increase the Flow of Wells.

Thomas Gallagher, a Pittsburg oil-well driller, has brought out an invention to clean oil wells and increase their flow. The idea is to remove the debris made by shooting wells, as the sand and gravel in the cavity in the bottom retard the flow of oil. To do this, Mr. Gallagher has devised a tool weighing about 400 pounds. It is practically an ordinary pair of light jars, with arms three and a half feet long attached. They hinge on the upper portion of the jars, and recess into the cavity of the upper portion. The closing of the jar, when it strikes the bottom of the well, causes the arms to extend themselves in the cavity of the well, and the rotary motion of the cable whirls the arms around, threshing down the sand and gravel and bringing the debris to the center of the cavity, where the bailed can pick it up and bring it to the surface. It is stated that wells have doubled their flow after being thus cleaned.

Moving Dynamite.

Dynamite may be hauled in wagons, railway trains, mine cars, or similar vehicles, care being exercised that percussion caps, exploders, fulminators, friction matches, or any other article of like nature be not loaded in the same wagon, car or other vehicle. Too much care cannot be exercised in this particular detail.

Appreciating the fact that the demand for a simple and reliable engine that would be more economical, safer, cleaner, and occupy less floor space than the steam engine, with its coal and ash heaps, water service, its long and tedious and very costly waits, while raising steam an hour or so before actually needing the power thus generated, and the consequent loss of energy after the engine is stopped, with all the attendant vexations, dangers of fire and explosions; in fact, a motor that can be used anywhere, by anyone, for any purpose, which would not require attention while in operation, either as regards supplying the fuel, or regulating the amount of power and speed, is constantly increasing, the Weber Gas and Gasoline Engine Co., of 434 S. W. Boulevard, Kausas City, Mo., have supplied the demand in the manufacture of Weber Engine and Hoist. Send for their

catalogue, No. 14, just out. It is full of useful information.

The well known State Ore Sampling Co. of Denver, Col., Messrs. Baily & Monnig, managers, are now in the market for Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolfram, Cobalt and Antimony ores, and pay highest cash prices for same. Their long experience in the market enables them to obtain the highest cash price for all marketable ores, and their modern mills and machinery has placed their facilities for sampling ores at the top notch.

Miners will do well to correspond with these people before sending their ores to market.

The Mining Reporter of Denver, Col., gives the *Western Mining World* of Butte, Montana, a calling down because that paper contained an article describing an Idaho mine, the ore from which runs \$60 in silver and 65 per cent. lead, and which is susceptible of concentrating "three into one." We have no doubt the above was a typographical error on the part of the *World*.

General Uses of Fireclay.

Fireclay in some one of its varied forms and grades may be put to almost any use to which any grade of clay can be used. When used for pottery ware it is called potter's clay, and when used for making tile it is called tile clay, etc. The fireclays of the coal measures of Pennsylvania are used for the manufacture of the following classes of ware: furnace brick; mill brick; and coke-oven brick of all grades. The most refractory grades of each are made from the flint clay with only enough plastic clay to bind the particles of flint clay. The bricks requiring great abrasive strength must have a correspondingly increased proportion of plastic clay of high refractory power. The coke ovens require a very elastic brick. While they are not subject to the very high temperature of the blast furnace they are subject to numerous and violent changes of temperatures, as about every 48 hours the coke is cooled by throwing cold water over it, and the firebricks are suddenly cooled from a red heat by this cold water bath.

Locomotive tiling consumes large quantities of fireclay and requires a clay of high refractory power. Some clays which have an established reputation in this line are shipped long distances. Locomotive tiling is shipped from Pennsylvania to the most distant part of the United States and several foreign countries.

Glass pots require a highly refractory fireclay, carefully selected and prepared. Probably greater care is taken in the selection and preparation of glass pots than for any other grade of refractory ware. The pots must not only withstand the high temperature of the furnace, but must at the same time resist the strong chemical action of the salt cake and other materials in the glass mixture, and must remain sufficiently rigid to hold the large batch of liquid glass. The clay is selected by hand with great care. It is all broken into small fragments with a hand hammer and every impurity picked out. It is then ground and mixed, often by tramping with the bare feet, and allowed to lie in heaps and sweat for several months before using. The pots are built up by hand, a few inches at a time and it requires several weeks to build one and several months to dry one. They are not burnt until they are put in the glass furnace ready for use and not permitted to cool until they are burnt out. Some glass-pot clays are ob-

tained from the fireclays in Western Pennsylvania, but the greater part of that used is imported from Germany and England, although considerable quantities are obtained in Missouri.

PERSONAL NEWS ITEMS

MR. NEDRHAM, who is associated with Johann Wulfsson in handling mining properties in the Kootenays, has been in that territory the past week looking over some of their holdings in the Fort Steele district.

BRUCE M. GLASGOW, a placer mine owner from Dutch Guiana, is in Colorado studying the dredges and other modern placer machines to determine what is best to use on his Guiana property. He goes from Denver to Idaho and thence to California.

J. E. ROTHWELL is just completing a new 30 ton chlorination mill at Sugar Loaf, Colorado.

O. B. HARDY, who has been on a visit to Sonora, Mexico, has succeeded in interesting San Francisco, Cal., capital in some excellent Sonora mining properties.

IRA LORRICK, of the Ferguson & Lorrick Placer Co., left Oakland, Cal., for the mines of the company near Grant's Pass, Oregon.

PROF. E. F. DUMBLE, state geologist of Texas, has returned to Austin, Texas from the Yaqui Country of Sonora Mexico, and will probably return to Sonora the latter part of this month.

E. L. GIROUX, of Arizona, still retains an interest in the rich mining property at Pilaras, Sonora Mexico.

CHARLES CONNERS and A. E. WATTS have discovered an asbestos prospect several miles above Cranbrook, in the Fort Steele country of British Columbia.

JIM NIMON is superintendent of the Pumping Association of Leadville, Colo., in charge of the practical work of unwatering the down-town mines.

W. P. BELDING returned home to Grant's Pass, Oregon from the East Kootenai, B. C., country last week. He has been prospecting this summer and located several claims, and has been fortunate in bonding some of them.

PROF. W. P. BLAKE, the well-known geologist, who is now interested in Arizona, was recently a visitor to Denver, Col.

C. H. WILLIAMS, M. C. E., of Belfast, Ire., has arrived in Nelson, B. C., and will spend sometime looking over that section. Mr. Williams is expecting his principals, R. J. O'Neil, M. P., and W. A. Grainger, two wealthy north of Ireland gentlemen. It is their intention to make investments in that country.

CAPTAIN PAT DURACK, of Pecos, Texas, has just had a streak of luck for which many hard-working miners may well envy him. By simple denouement he has become the owner of what was formerly known as the Promontorio mine, 12 miles from Bacera and 90 miles northwest from Casas Grandes, the terminus of the Sierra Madre line. This property belonged originally to a Chicago syndicate which spent some \$50,000 in gold developing it, erecting buildings and putting up machinery, and working about 200 feet of shafts and a tunnel of 150 feet in length.

H. B. VERCOG, the mining man who has charge of the English Syndicate's property in the Gavilin Grant near Perris, Riverside county, California, has recently returned from England.

SAVRY BRADLEY, receiver for the Edgemont and Union Hill properties, recently made a visit to the company's mines in the Black Hills of South Dakota. Mr. Bradley is from Philadelphia, Pa., and was accompanied by Messrs. A. Bitney and S. A. Leith, also of Philadelphia.

CAPT. THOMAS COUCH, of Butte, Montana, is at present in Southern Oregon, looking over some mining properties, and it is expected he will bond some of them.

ROBERT BARTLETT, the mine operator of Nogales, Arizona, recently made a trip to Hermosillo, Sonora, Mexico.

W. A. CARLYLE, of Rossland, B. C., mining engineer in charge of the properties of the British America Corporation, and formerly provincial mineralogist was in Toronto, Ontario, Canada, last week purchasing supplies for the company.

LOUIS RUHL, agent for the Roessler & Hasslacher Chemical Co. of New York was a recent visitor at THE JOURNAL office.

SAL-SODA.

For domestic, 50c. per 100 lbs., less usual discounts; English, 66c. @ \$1.65; Concentrated sal-soda, \$1.60 @ \$1.65 per 100 lbs.

CHLORATE OF POTASH.

Chlorate of potash is quoted at \$9.50 and \$9.75 per 100 lbs.

CHLORIDE OF IRON.

English prime brands \$1.00@\$1.70 American, \$1.70@\$1.80; Continental F., \$1.60@\$1.60 per 100 lbs.

Acids.

Demand are good while stocks in maker's hands are comparatively small. Blue vitrol is scarce, and up to \$3.87½ is asked for the best grades, while ordinary kinds are hardly being offered. Imports included 95 bbls and 30 casks oxalic.

Quotations are per 100 lbs from New York and vicinity as follows: Acetic acid, commerce, No. 8, \$1.40@\$1.50; muricatic acid, 18°, \$1.10@\$1.75; 20°, \$1.20@\$1.87½; 22°, \$1.35@\$2.25; according to quantity and brand. Nitric acid 36°, \$3.50@\$4.75; 38°, \$3.75@\$4.62½; 40°, \$4.60@\$4.87½; 42°, \$4.62½ @\$5.25. Oxalic acid, \$6.50@\$6.75. Mixed acids, according to mixture. Sulphuric acid, 66°, \$1.10 for drums and \$1.15@\$1.75 for earthenware. Chamber acid 60°, \$11.50@\$12 per ton f. o. b. factory. Blue vitrol \$3.50@\$3.62½ for extra grades and \$3.37½ for ordinary.

BRIMSTONE.

Spot brimstone is very scarce, and small buyers are obliged to pay as high as \$24 and \$25 per ton for best unmixed seconds, and about \$1 less for thirds. Large buyers are however favored with much lower prices, and quotations by importers are \$22.50 and \$23 per ton for best unmixed seconds on spot, and \$21 and \$21.75 for futures; thirds are \$19.50 to \$20 to arrive.

NITRATE OF SODA.

Buyers and sellers of nitrate of soda are still to far apart to come to any large sales, though about 5,000 bags were sold recently at \$1.52½ per 100 lbs. Sellers are quoting up to \$1.55 for spot, and for futures extending through December, 1898, \$1.65 to \$1.67½ per 100 lbs.

FINANCIAL NOTES.

Average Prices of Metals

in New York per pound from January 1, 1898:					
Month	Copper	Tin	Lead	Bleeker	
January	10.99	13.87	3.05	3.95	
February	11.25	13.94	3.05	3.95	
March	11.95	14.15	3.05	3.95	
April	11.14	14.60	3.05	4.26	
May	11.22	14.62	3.05	4.22	
June	11.82	14.72	3.02	4.22	
July	11.63	14.75	3.02	4.22	
August	11.92	14.75	3.02	4.55	
September	12.10	14.72	3.02	4.55	
October	—	—	—	—	
November	—	—	—	—	
December	—	—	—	—	

Average Monthly Prices of Silver.

In New York per ounce Troy, from January 1, 1898, and for the years 1897 and 1896:					
Month	1898	1897	1896	1897	1896
January	60.77	60.70	61.57	60.70	61.57
February	60.07	60.07	60.62	60.07	60.62
March	60.00	60.00	61.00	60.00	61.00
April	60.02	60.02	61.00	60.02	61.00
May	60.00	60.00	60.72	60.00	60.72
June	60.61	60.10	60.00	60.61	60.00
July	60.00	60.61	60.75	60.00	60.75
August	60.51	54.19	60.75	60.51	60.75
September	60.00	54.20	60.75	60.00	60.75
October	—	57.00	60.05	—	60.05
November	—	57.00	60.93	—	60.93
December	—	58.01	60.24	—	60.24
Year.	54.79	60.73	60.00	54.79	60.73

The statement of the United States Treasury, on Thursday, Sept. 29, shows balances in excess of outstanding certificates as below, comparison being made with the statement for the corresponding date last week:

	Oct. 1,	Oct. 10, 1898
Gold.....	\$24,841,220	\$24,784,220
Silver.....	6,655,050	6,655,050
Legal Tenders, etc.	1,000,000	1,000,000
Total.....	\$32,500,270	\$32,439,270

Treasury deposits with national banks amounted to \$79,740,464, an increase of \$3,392,304 during this week.

Gold and Silver Exports and Imports.

At all United States ports, August, 1898, and year from January 1st, 1898 and 1897:

	AUGUST,	JULY,
Gold—Imports.....	\$1,013,500	\$1,195,175
Imports.....	9720,500	6,832,027
Excess.....	—	1,181,675
Silver—Exports.....	35,400	51,251,300
Imports.....	3,655,200	1,300,000
Excess.....	31,745,200	50,951,300
FIVE MONTHS,	1897	1898
Gold—Exports.....	\$32,542,000	\$1,147,411
Imports.....	31,892,654	1,300,000
Excess.....	\$1,649,356	1,847,411

This statement includes the exports and imports at all United States ports, the figures being furnished by the Bureau of Statistics of the Treasury Department

WANTS

Advertisements of this class containing not more than five lines will be inserted for not exceeding three months in any year, free of charge, to all paid-up annual subscribers.

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PINK Copper property in Mexico. A one-half interest in a good producing copper property will be given for required capital to do the necessary development work and placing machinery thereon. Substantial guarantee. Address: "Mexico," 1012 Mission St., San Francisco, Cal.

A very extensive Lead Mining property located in West Virginia. Shafts 3000 ft. deep, at work has demonstrated richness of veins and purity of ore. Address: GEORGE FRANKE, Baltimore, Md.

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INCORPORATED MINES PAYING DIVIDENDS.

NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Mineral Produced
1 Aetna Cong.	California	100,000	\$ 600,000	\$ 5	\$ 10	Oct 1898	\$ 150,000	Q.
2 Alaska, Treadwell	Alaska	200,000	5,000,000	25	37½	July 1898	3,550,000	G.
3 Alaska Mexican.	Alaska	200,000	1,000,000	5	10	July 1898	299,001	G.
4 Alice.	Montana	400,000	10,000,000	25	06	April 1898	1,075,000	G. S.
5 Alice.	Utah	400,000	10,000,000	25	05	Sept 1898	2,525,000	S. L. G.
6 Anaconda	Montana	1,200,000	30,000,000	25	1 25	May 1898	6,750,000	C.
7 Anchorage Leland	Colorado	600,000	600,000	1	01	Aug 1898	150,000	G.
8 American Gold.	Colorado	800,000	8,000,000	10	06	Sept 1898	336,000	G. S. L.
9 Atlantic.	Michigan	40,000	1,000,000	25	1 00	Feb. 1898	700,000	S.
10 Bald Butte.	Montana	250,000	250,000	1	03	Sept 1897	512,500	G. C. S.
11 Big Six.	Colorado	500,000	500,000	1	00	May 1898	15,000	G. S.
12 Boston & Montana	Montana	150,000	8,750,000	25	5 00	Aug 1898	8,375,000	G. C. S.
13 Bullion Beck and Champion.	Utah	100,000	1,000,000	10	10	Sept 1898	2,225,000	G. S.
14 Bunker Hill and Sullivan.	Idaho	300,000	8,000,000	10	07	Sept 1898	537,000	S. L.
15 Caribbean.	British Col.	80,000	800,000	1	02	July 1898	220,905	G.
16 Canfield & Hecla.	Michigan	10,000	2,500,000	25	10 00	Sept 1898	51,850,000	C.
17 Centennial Eureka	Utah	30,000	1,500,000	50	1 00	Mar 1897	2,010,000	S. L.
18 Central Lead.	Missouri	10,000	1,000,000	100	1 00	Sept 1898	16,980	L.
19 Champion.	California	34,000	340,000	10	25	April 1898	246,200	G.
20 Charleston.	S. Carolina	10,000	1,000,000	100	1 50	Sept 1898	165,000	.
21 Chloride Point.	Utah	500,000	500,000	1	01	Dec 1897	5,000	G. S.
22 Colorado Smelting.	Montana	100,000	1,000,000	10	50	July 1898	1,505,000	G. S. C.
23 Crescent.	Utah	24,000	600,000	25	.....	July 1897	280,000	.
24 Crowned King.	Arizona	600,000	6,000,000	10	02	Aug 1898	181,000	G. S. L.
25 Daly.	Utah	150,000	8,000,000	20	25	Mar 1897	2,925,000	S. L.
26 Deadwood Terra.	S. Dakota	200,000	5,000,000	25	05	May 1898	1,370,000	G.
27 De Lamar.	Idaho	400,000	2,000,000	5	29	May 1898	2,471,900	S. L.
28 Elkhorn Consolidated.	Colorado	1,250,000	1,250,000	1	01	Sept 1898	616,001	G. S.
29 El Paso.	Colorado	650,000	650,000	1	01	Jan 1898	12,093	G. S.
30 Empire State.	Idaho	75,000	750,000	10	10	Aug 1898	15,000	.
31 Fern.	British Col.	200,000	200,000	1	05	Jan 1898	10,000	.
32 Florence.	Montana	500,000	2,500,000	5	01	May 1897	132,530	S.
33 Gaylor-Marion.	Utah	300,000	1,500,000	5	02	Sept 1898	96,000	G.
34 Gold Coin of Victor.	Colorado	1,000,000	1,000,000	1	01	Sept 1898	110,000	G.
35 Golden Cycle.	Colorado	20,000	1,000,000	5	00½	Aug 1898	155,000	.
36 Gold Coin.	Colorado	200,000	1,000,000	5	05	Nov 1897	160,000	G. S.
37 Gold and Globe.	Colorado	750,000	750,000	1	3-10	July 1897	51,625	G.
38 Golden Reward.	S. Dakota	1,00,000	.....	15	.....	Feb 1898	155,000	G.
39 Grand Central.	Utah	20,000	260,000	1	12½	Sept 1898	12,000	G. S. C. L.
40 Hecla Consolidated.	Montana	30,000	1,500,000	50	50	Feb 1897	2,175,000	S. G. L. C.
41 Highland.	S. Dakota	100,000	10,000,000	100	20	Sept 1898	3,724,718	G.
42 Holy Terror.	S. Dakota	300,000	300,000	1	03	Aug 1898	108,000	G.
43 Homestake.	S. Dakota	125,000	12,500,000	100	50	Sept 1898	6,903,750	G.
44 Hope.	Montana	100,000	1,000,000	10	10	Mar 1898	762,252	S.
45 Horn Silver.	Utah	400,000	10,000,000	25	05	Sept 1898	5,210,000	S. L.
46 Idaho.	British Col.	500,000	500,000	1	05	May 1898	261,000	.
47 Iowa.	Colorado	1,000,000	1,000,000	1	00½	June 1898	90,000	G.
48 Iron Mountain.	Montana	500,000	5,000,000	10	100	Jan 1898	501,100	S.
49 Isabella.	Colorado	2,250,000	2,250,000	1	00½	June 1897	270,000	G.
50 Kearsarge.	Michigan	40,000	1,000,000	25	10	Aug 1897	160,000	C.
51 Kennedy.	California	100,000	10,000,000	100	48	Aug 1898	1,756,000	G.
52 Last Chance.	British Col.	500,000	500,000	1	04	Jan 1897	42,000	S. L.
53 Le Roi.	British Col.	500,000	2,500,000	5	10	Apr 1898	775,000	G.
54 Lille.	Colorado	1,000,000	1,000,000	1	01	Sept 1898	134,110	G.
55 Minnesota.	Minnesota	185,000	18,500,000	100	1 50	Oct 1898	4,735,000	L.
56 Montana Ltd.	Montana	860,000	3,300,000	5	05½	May 1898	2,087,657	G. S.
57 Montana Ore Purchasing.	Montana	40,000	1,000,000	25	1 00	July 1898	760,000	.
58 Morning Star.	California	2,400	240,000	100	5 00	June 1898	868,800	G.
59 Mt. Rosa.	Colorado	1,000,000	1,000,000	1	02	Jan 1898	80,000	G.
60 Mercur.	Utah	200,000	5,000,000	25	12½	Sept 1898	1,166,000	G.
61 Mammoth.	Utah	400,000	10,000,000	25	05	Sept 1898	1,310,000	G. S. C. L.
62 Moon Anchor Gold.	Colorado	600,000	600,000	1	07½	Aug 1898	218,000	G.
63 New York & Hon. Rosario.	Central A.	150,000	1,500,000	10	10	July 1898	930,000	S. G.
64 Napa.	California	100,000	700,000	7	20	Oct 1898	150,000	Q.
65 New Idria Quicksilver.	California	100,000	500,000	5	20	Sept 1898	80,000	Q.
66 Ontario.	Utah	150,000	15,000,000	100	75	Dec. 1897	13,542,500	S. L.
67 Osceola.	Michigan	50,000	1,250,000	25	1 00	June 1898	2,272,500	C.
68 Parrot.	Montana	230,000	2,300,000	10	30	July 1898	2,000,988	C.
69 Pennsylvania Consolidated.	California	51,500	5,150,000	10	05	Aug 1898	43,925	.
70 Pioneer.	California	100,000	1,000,000	10	12½	Aug 1898	37,500	G.
71 Portland.	Colorado	3,000,000	3,000,000	1	02	Aug 1898	1,597,080	G. S.
72 Princess.	Colorado	1,000,000	1,000,000	1	00½	Feb 1897	45,000	G.
73 Quincy.	Idaho	100,000	2,500,000	25	3 50	Aug 1898	10,120,000	C.
74 Rambler-Cariboo.	British Col.	1,000,000	1,000,000	1	02	April 1897	40,000	.
75 Raven.	Colorado	1,500,000	1,500,000	1	01	March 1898	20,000	G.
76 Rico.	British Col.	1,000,000	1,000,000	1	10	Jan 1898	247,500	S. L.
77 Republic.	Washington	1,00,000	1,000,000	1	03	Oct 1898	30,000	G.
78 Sacramento.	Utah	1,000,000	5,000,000	5	00½	Sept 1898	57,000	G.
79 Santa Rosalia.	California	100,000	100,000	1	10	Feb. 1898	125,000	G. S.
80 Small Hopes Consolidated.	Colorado	250,000	5,000,000	20	10	June 1898	3,300,000	S.
81 South Swans.	Utah	150,000	150,000	1	05	Oct 1898	12,000	S. L.
82 Standard.	California	200,000	20,000,000	100	10	Aug 1898	5,674,940	G. S.
83 St. Joseph.	Missouri	30,000	3,000,000	10	1 50	Sept 1898	2,737,000	L.
84 Silver King.	Utah	150,000	8,000,000	20	25	Sept 1898	1,687,000	S. L. G.
85 Slocan Star.	British Col.	2,000,000	1,000,000	0.50	06	Mar 1897	350,000	.
86 Smuggler.	Colorado	1,000,000	1,000,000	1	01	June 1898	1,015,000	S. L. Z.
87 Swanner.	Utah	10,000	500,000	5	05	Sept 1898	116,700	S. L.
88 Tom Boy.	Colorado	200,000	2,000,000	10	10	Dec 1896	600,000	G.
89 Tamarack.	Michigan	60,000	1,500,000	15	3 00	June 1898	5,330,000	C.
90 Union.	Colorado	1,250,000	1,250,000	1	01	June 1896	73,000	S.
91 Victor.	Colorado	200,000	1,000,000	5	50	Sept 1898	1,055,000	G.
92 Vindicator.	Colorado	1,500,000	1,500,000	1	05	July 1898	76,125	G.
93 Western Mine Enterprise.	Montana	500,000	500,000	1	20	Jan 1898	48,680	.
94 War Eagle.	British Col.	2,000,000	2,000,000	1	01½	Sept 1898	239,000	.
95 Wolverine.	Michigan	60,000	1,500,000	25	1 00	Oct 1898	90,000	C.
96 White Water.	British Col.	125,000	625,000	5	32	April 1898	191,000	.
97 Yellow Aster.	California	100,000	1,000,000	10	08½	Aug 1898	118,780	G.

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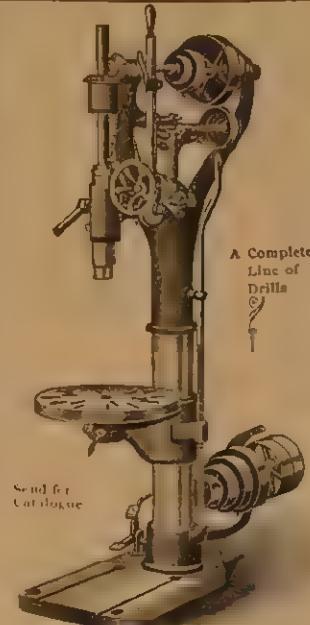
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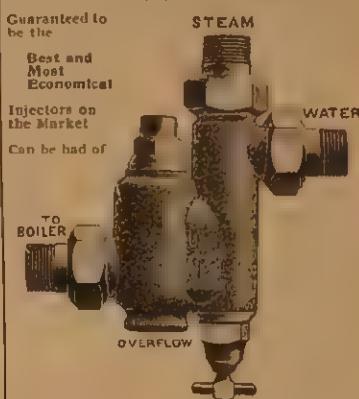
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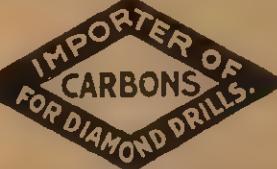


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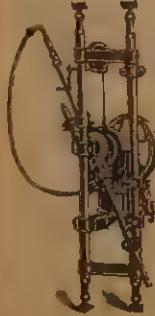
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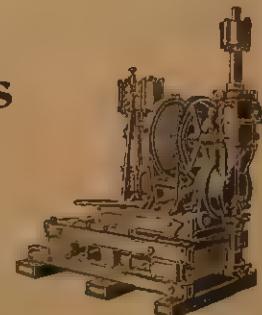
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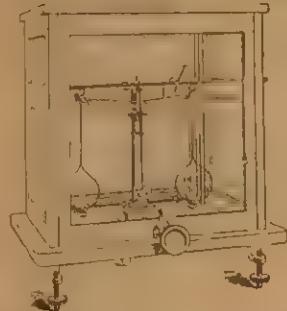
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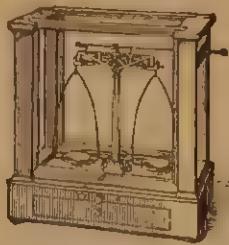
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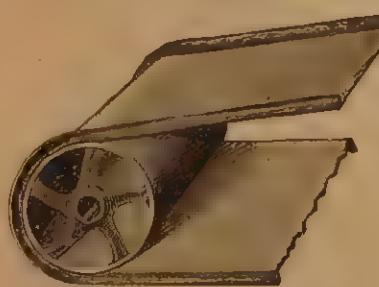
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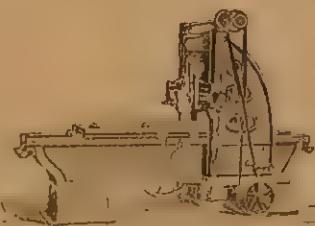
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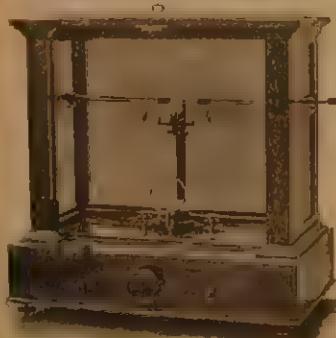
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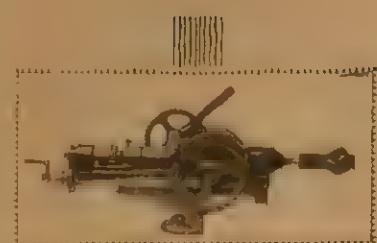
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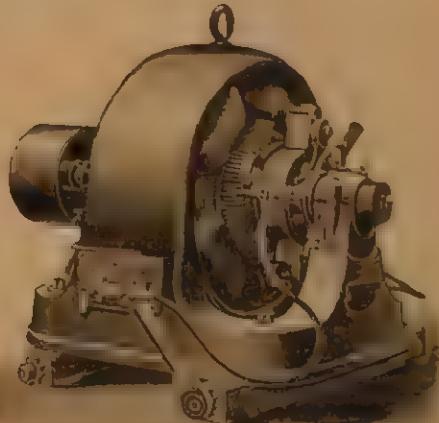
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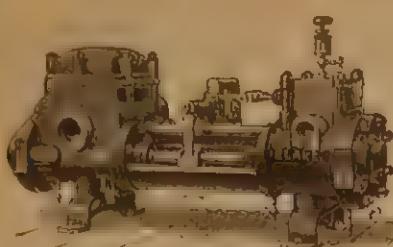
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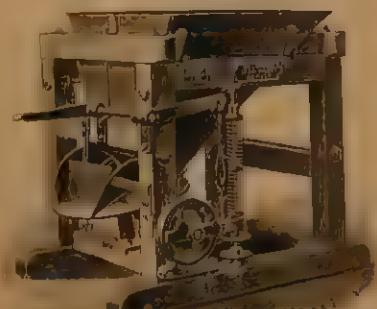
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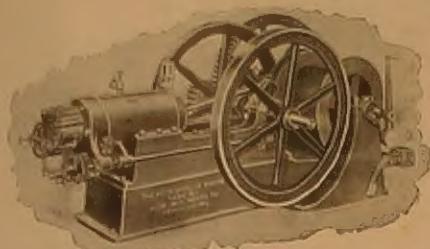
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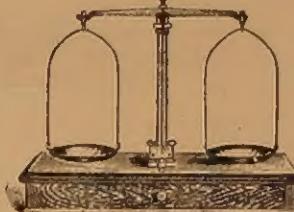
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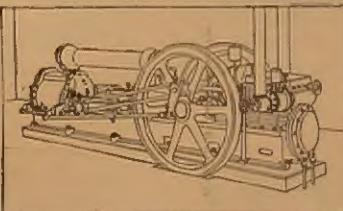


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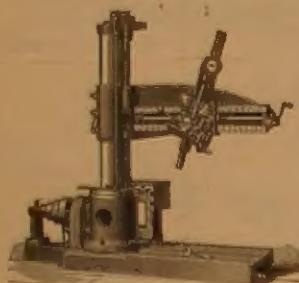
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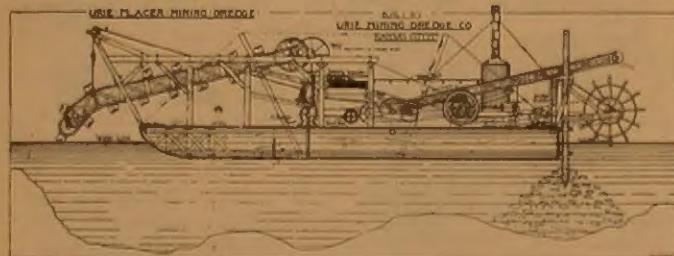
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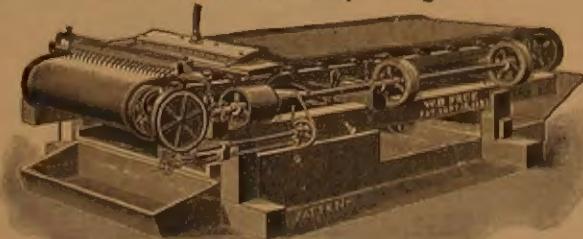
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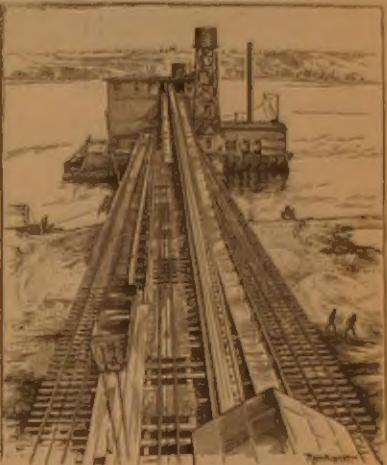
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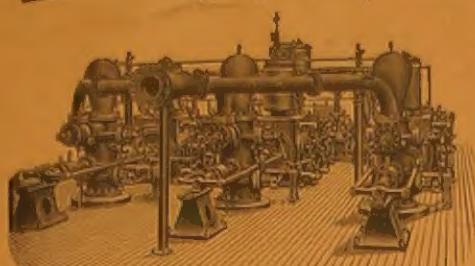
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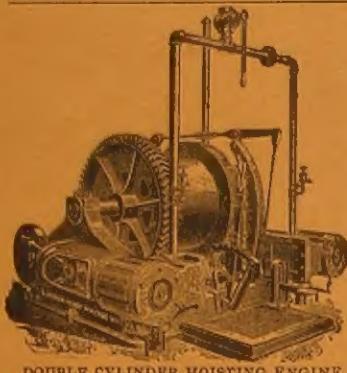
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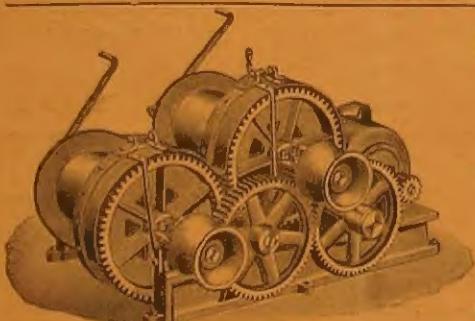
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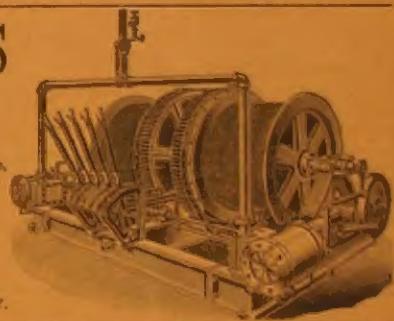
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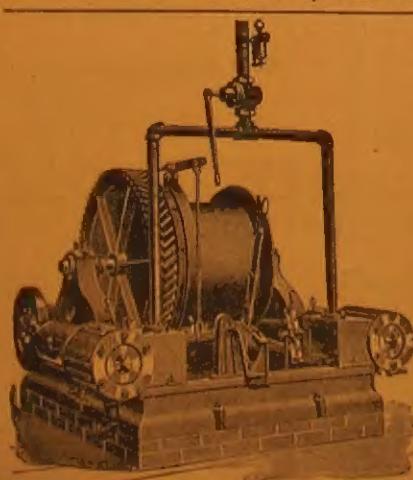
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